

REPORT NO.: 214D-MGA-99-12

V2990

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING
PASSENGER CARS

DAIMLERCHRYSLER CORPORATION

1999 DODGE GRAND CARAVAN

NHTSA NO: MX0307

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: December 18, 1998

Report Date: January 11, 1999

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1999 Dodge Grand Caravan to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 18, 1998. The impact velocity of the Moving Deformable Barrier (MDB) was 61.8 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 22.8 °C. The target vehicle post test maximum crush was 417 mm at level 3. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th> <th><u>DRIVER</u></th> <th><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>44</td> <td>59</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>51</td> <td>72</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>54</td> <td>88</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>53</td> <td>80</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>85</td> <td>139</td> </tr> </tbody> </table> The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.							<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	44	59	Left Lower Rib (LLR) Accel., g	51	72	Lower Spine (T ₁₂) Accel., g	54	88	Thoracic Trauma Index (TTI)	53	80	Pelvis (PEV) Accel., g	85	139
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17. Key Words New Car Assessment Program (NCAP) FMVSS No. 214D Side Impact Dummy (SID) Occupant Side Impact Protection				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590																			
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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY99 NCAP Side Impact Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-D-22001. The purpose of this test was to evaluate side impact protection of a 1999 Dodge Grand Caravan.

This side impact test was conducted in accordance with the New Car Assessment Program Side Impact Testing Procedure dated October 1996.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1999 Dodge Grand Caravan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 38.4 mph (61.8 kph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on December 18, 1998. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

Two Side Impact Dummies (SIDs) were placed in the driver and left rear designated seating positions according to instructions specified in the New Car Assessment Program Side Impact Laboratory Test Procedure which is dated October 1996. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)
5. Head Center of Gravity triaxial accelerometers (X, Y, and Z-direction)

Appendix B contains the vehicle and dummy response data traces. A summary of the side impact dummy (SID) configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The following table summarizes the results of the test:

Injury Criteria	Front SID	Rear SID
TTI (g)	53	80
Pelvis (g)	85	139

Traces of Stoddard solvent were collected during the post impact fuel system integrity test. Solvent was seen leaking into the fuel filler cavity as the vehicle was rolled over. The traces of solvent were collected as they dripped from the body panels.

SECTION 3
SIDE IMPACT DUMMY (SID) AND
VEHICLE TEST DATA

DATA SHEET NO. 1
GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan
 Vehicle NHTSA No.: MX0307 VIN: 2B4GP24G0XR186889
 Vehicle Body Color: Green Build Date: 10-98
 Engine Data: 6 Cylinders; CID; 3.3 Liter; cc
 Placement Longitudinal; X Lateral
 Transmission: 4 Speed; Manual; X Automatic; X Overdrive
 Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 88 miles

Options: X A/C; X Pwr. Steering; X Pwr. Brakes; X Pwr. Windows;
 X Cruise Control; X Tilt Wheel; X Power Door Locks;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 35 Psi FRONT
35 Psi REAR

Recommended Tire Size: P205/75R14

Tires on Test Vehicle: P205/75R14 Manufacturer: Goodyear

Vehicle Capacity Data:

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat, 7 Total

Type of Front Seats: X Bucket; Bench; Split Bench

Type of Front Seat Back: Fixed; X Adjustable with X Lever

Vehicle Maximum Capacity Loading = 521.6 kg (A)

No. of Occupants x 68.04 kg. = 476.3 kg (B)

Cargo Capacity (A-B) = 45.3 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>489.5</u> kg	Right Rear	=	<u>377.4</u> kg
Left Front	=	<u>542.9</u> kg	Left Rear	=	<u>371.0</u> kg
TOTAL FRONT	=	<u>1032.4</u> kg	TOTAL REAR	=	<u>748.4</u> kg
% of Total Vehicle Weight	=	<u>58.0</u> %;	% of Total Weight	=	<u>42.0</u> %
TOTAL WEIGHT	=	<u>1780.8</u> kg			

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 1999/Dodge/Grand CaravanVehicle NHTSA No.: MX0307 Test Date: December 18, 1998CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1780.8</u> kg
Cargo Carrying Capacity of Test Vehicle	=	<u>45.3</u> kg
Weight of 2 Side Impact Dummies (2 x <u>80.7</u> kg.)	=	<u>161.4</u> kg
TEST VEHICLE TARGET WEIGHT	=	<u>1987.5</u> kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO (Fully Loaded):

Right Front	=	<u>485.3</u> kg	Right Rear	=	<u>433.6</u> kg
Left Front	=	<u>614.2</u> kg	Left Rear	=	<u>454.5</u> kg
TOTAL FRONT	=	<u>1099.5</u> kg	TOTAL REAR	=	<u>888.1</u> kg
% of Total Weight	=	<u>55.3</u> %	% of Total Weight	=	<u>44.7</u> %
TOTAL WEIGHT	=	<u>1987.6</u> kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 759 mm Left Front 754 mm Right Rear 780 mm Left Rear 762 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 753 mm Left Front 733 mm Right Rear 754 mm Left Rear 723 mm

TEST ATTITUDE:

Right Front 750 mm Left Front 740 mm Right Rear 762 mm Left Rear 738 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 3040 mm

C.G. = 1325 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4698 mm

Centerline = 4988 mm

Left Side = 4700 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 1999/Dodge/Grand CaravanVehicle NHTSA No.: MX0307 Test Date: December 18, 1998FRONT SEAT CUSHION PLACEMENT:Total Length of Adjustment Travel: 220 mmTest Position: 12th detent of 23 totalFRONT SEAT BACK ADJUSTMENT POSITION:Seat Back Angle = 4.3° rearward from full up (22.6°)SECOND POSITION SEAT:Total Length of Fore/Aft Adjustment Travel: Non-adjustableSeat Back Adjustment Position: Non-AdjustableADJUSTABLE STEERING COLUMN POSITION: 6th position down of 8 total

WINDOW POSITIONS: Left Front Closed Left Rear Closed
 Right Front Open Right Rear Removed

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:Fuel system usable capacity = 20.0 gallonsTest Volume: 18.6 gallons 93 % of capacityLOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:Wheelbase: = 3040 mmImpact Point is 508 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan
 Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998
 Overall Length = 4988 mm; Overall Width = 1934 mm

TEST WEIGHT:

Right Front	= <u>518.0</u> kg	Right Rear	= <u>428.7</u> kg
Left Front	= <u>599.6</u> kg	Left Rear	= <u>435.0</u> kg
TOTAL FRONT	= <u>1117.6</u> kg	TOTAL REAR	= <u>863.7</u> kg
% of Total Weight	= <u>56.4</u> %	% of Total Weight	= <u>43.6</u> %
TOTAL VEHICLE WEIGHT = <u>1981.3</u> kg			
Wheelbase = <u>3040</u> mm			
Longitudinal C.G. from Center of Front Axle = <u>1325</u> mm			
Impact Angle with Respect to Impactor = <u>90°</u> degrees			

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (265 mm above ground) = 270 mm
2. LEVEL 2 (692 mm above ground) = 409 mm
3. LEVEL 3 (755 mm above ground) = 417 mm
4. LEVEL 4 (1002 mm above ground) = 323 mm
5. LEVEL 5 (1600 mm above ground) = 88 mm

Maximum Post-Test Intrusion = 417 mm

OCCUPANTS:

	<u>Driver</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>Type II belt and</u> <u>frontal airbag</u>	<u>Type II belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels:		=	<u>26</u>
Number of Cameras:	Onboard Vehicle	=	<u>3</u>
	Offboard Vehicle	=	<u>4</u>
	Deformable Barrier	=	<u>2</u>
	TOTAL	=	<u>9</u>

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTSYear/Make/Model/Body Style: 1999/Dodge/Grand CaravanVehicle NHTSA No.: MX0307 Test Date: December 18, 1998POSITION OF IMPACT (MDB) ON MONORAIL:Crabbed 27° to leftMDB DETAILS:Overall Width of Framework Carriage = 1252 mmOverall Length of MDB (incl. honeycomb impact face) = 4115 mmWheelbase of Framework Carriage = 2591 mmTread of Framework Carriage (Front & Rear) = 1880 mmC.G. Location Rearward of Front Axle = 1098 mmC.G. Location From Center Line = -15 mmC.G. Location Above Ground Level = 485 mmMDB WEIGHT:Left Front = 457.7 kg Left Rear = 235.1 kgRight Front = 328.1 kg Right Rear = 342.6 kgTOTAL FRONT = 785.8 kg TOTAL REAR = 577.7 kgTOTAL MDB WEIGHT = 1363.5 kgImpact Angle (MDB C/L to Target Vehicle C/L) = 90° degreesImpact Speed = Primary: 38.4 mph (61.8 kph) Secondary: 38.5 mph (62.0 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

- | | | |
|----|---------------------------------|-----------------|
| 1. | Row A Top of Stack (813 mm) | = <u>153</u> mm |
| 2. | Row B Mid Stack (686 mm) | = <u>83</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = <u>64</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = <u>90</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Frontal airbag</u>	<u>C-post and right rear seat headrest</u>
Arm	<u>Rear of door panel</u>	<u>Upper rear door panel</u>
Pelvis	<u>Door panel below armrest</u>	<u>Mid door panel</u>
Left Knee	<u>Door panel</u>	<u>Mid front of door panel</u>
Right Knee	<u>Left knee</u>	<u>Left knee</u>

DOOR OPENING:

	<u>LEFT SIDE</u>	<u>RIGHT SIDE</u>
Front	<u>Remained closed</u>	<u>Remained closed</u>
Rear	<u>Remained closed</u>	<u>Remained closed</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 18 mm rearward Vertical: 5 mm high

ARM REST LOCATIONS:

Front: 126 mm from bottom of window to top of armrest

Rear: N/A

POST-TEST OBSERVATIONS (Cont'd)SEAT CRUSH:

Front Seat Back: 35 mm Front Seat Cushion: 0 mm
Left Rear Seat Back: 0 mm Rear Seat Cushion: 9 mm

GLAZING DAMAGE:

Windshield cracked

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

None noted

OTHER NOTABLE IMPACT EFFECTS:

Gas door opened and frontal airbag deployed on impact

AIRBAG DEPLOYMENT STATUS:

	<u>DRIVER</u>	<u>REAR PASSENGER</u>
Frontal	<u>Yes</u>	<u>N/A</u>
Side	<u>N/A</u>	<u>N/A</u>

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5
SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA

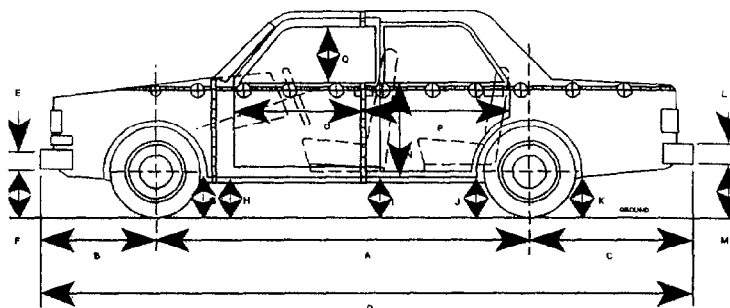
Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

	Driver SID ID # 271			Left Passenger SID ID # 272		
	Pos. Direct.		Neg. Direct	Pos. Direct.		Neg. Direct
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS						
Left Upper Rib (LUR) Y	44.0	50	-6.9	94	58.5	54
Left Lower Rib (LLR) Y	51.3	49	-6.6	119	72.3	54
SPINE ACCELERATIONS						
Lower Lateral Y	54.2	43	-7.9	60	88.1	52
PELVIS ACCELERATIONS						
Lateral Y	85.4	42	-11.8	74	139.2	46
					-13.6	79

REFERENCE: Positive Direction- Longitudinal (X) = forward
Lateral (Y) = to right
Vertical (Z) = down

DATA SHEET NO. 6
VEHICLE PRE AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

D = Length at Centerline

R = Right Side Length

S = Left Side Length

T = Width at B Post

E & L = Bumper Thickness

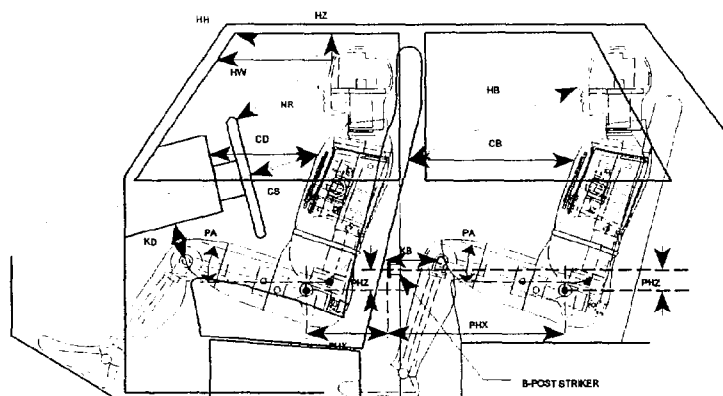
J1 = To Pinch Weld

J2 = To Sill

ALL MEASUREMENTS IN (mm)

	PRE-TEST	POST-TEST	Δ CHANGE
A	3040	3020	-20
B	890	890	0
C	1058	1055	-3
D	4988	5025	37
E	205	205	0
F	388	415	27
G	202	196	-6
H	202	197	-5
I	208	214	6
J1/J2	219/211	249/238	30/27
K	254	261	7
L	200	200	0
M	310	298	-12
N	772	651	-121
O	911	875	-36
P	1080	1036	-44
Q	612	622	10
R	4698	4711	13
S	4700	4609	-91
T	1934	1557	-377

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 1999/Dodge/Grand CaravanNHTSA NO.: MX0307 Test Date: December 18, 1998

LEFT SIDE VIEW

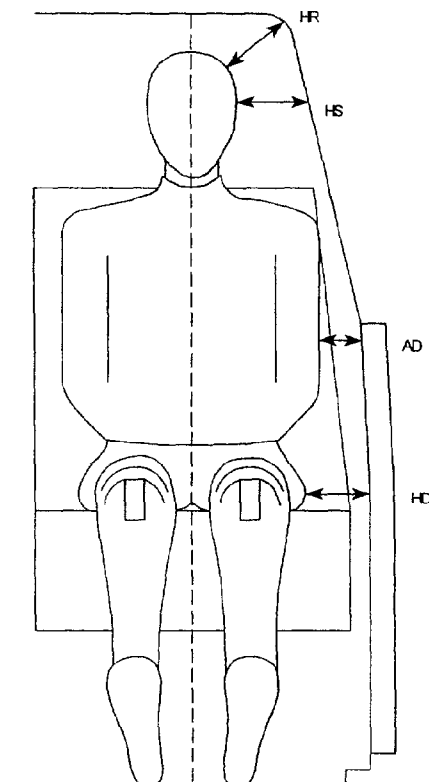
NOTE: 2-DOOR VEHICLE SHOWN
 REAR DUMMY PHZ & PHX
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

NOTE: All dimensions are in mm with tolerance of ± 3 mm

	DRIVER SID ID # 271		LEFT REAR PASSENGER SID ID # 272
HH	343	HZ	186
HW	563	NB	712
HZ	176	CB	630
NR	390	KBL (KBA)	281 (0.0°)
CD	556	KBR (KBA)	293 (0.0°)
CS	301	PA°	24.4°
KDL(KDA°)	223 (0.0°)	PHX	188
KDR(KDA°)	231 (0.0°)	PHZ	58
PA°	23.1°		
PHX	240		
PHZ	18		

NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

DATA SHEET NO. 8

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 1999/Dodge/Grand CaravanNHTSA NO.: MX0307 Test Date: December 18, 1998

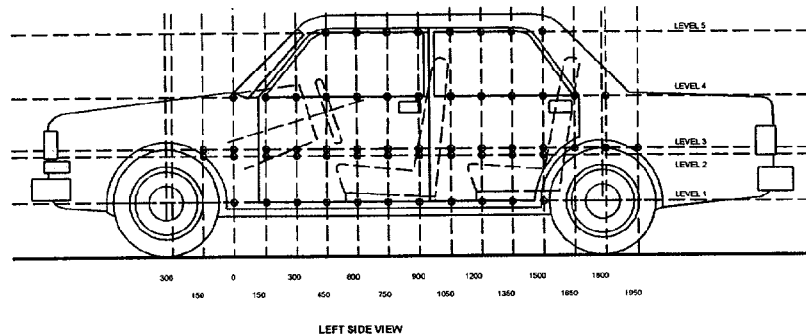
NOTE: All dimensions are in mm

	DRIVER SID ID # 271	LEFT REAR PASSENGER SID ID # 272
HR	258	245
HS	316	372
AD	150	170
HD	141	278

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

NHTSA NO.: MX0307 Test Date: December 18, 1998



NOTE: All measurements are in millimeters (mm)

LEVEL 5 - WINDOW TOP
LEVEL 4 - WINDOW SILL
LEVEL 3 - OCCUPANT H-POINT
LEVEL 2 - MID-DOOR
LEVEL 1 - AXLE CENTERLINE HEIGHT OR SILL TOP HEIGHT

MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED" CONFIGURATION

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>265</u> mm
Level 2 @ Mid Door	= <u>692</u> mm
Level 3 @ Occupant H-Point	= <u>755</u> mm
Level 4 @ Window Sill	= <u>1002</u> mm
Level 5 @ Window Top	= <u>1600</u> mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

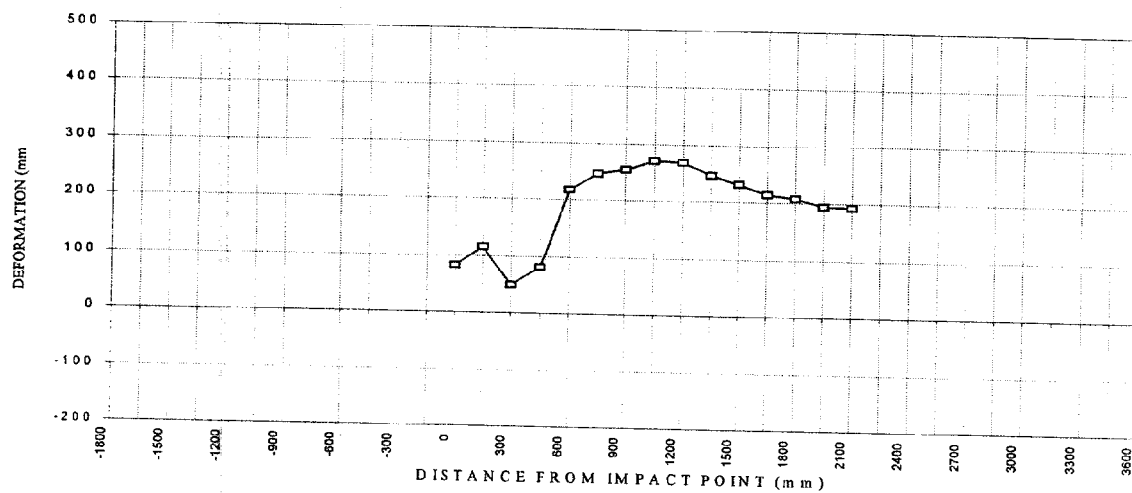
	Level 1 - Axle Centerline		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	874	957	83
150	870	986	116
300	867	915	48
450	862	943	81
600	858	1075	217
750	858	1104	246
900	857	1111	254
1050	853	1123	270
1200	853	1121	268
1350	853	1099	246
1500	852	1083	231
1650	852	1066	214
1800	852	1060	208

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 1 - Axle Centerline		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	853	1047	194
2100	853	1046	193
2250			
2400			
2550			
2700			
2850			
3000			
3150			
3300			
3450			
3600			

Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 1 - AXLE CENTERLINE

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 2 - Mid Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150	763	838	75
0 (impact point)	760	904	144
150	756	1013	257
300	755	1056	301
450	754	1084	330
600	752	1102	350
750	750	1114	364
900	749	1139	390
1050	748	1153	405
1200	748	1154	406
1350	748	1155	407
1500	747	1156	409
1650	747	1152	405
1800	745	1132	387

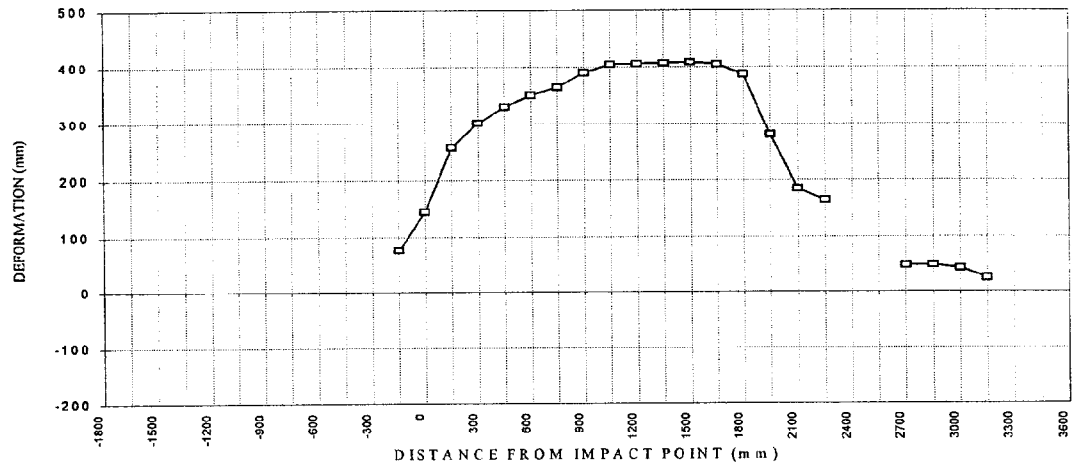
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 2 - Mid Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	742	1022	280
2100	740	925	185
2250	742	906	164
2400			
2550			
2700	747	793	46
2850	754	801	47
3000	766	807	41
3150	782	806	24
3300			
3450			
3600			

Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 - MID DOOR

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

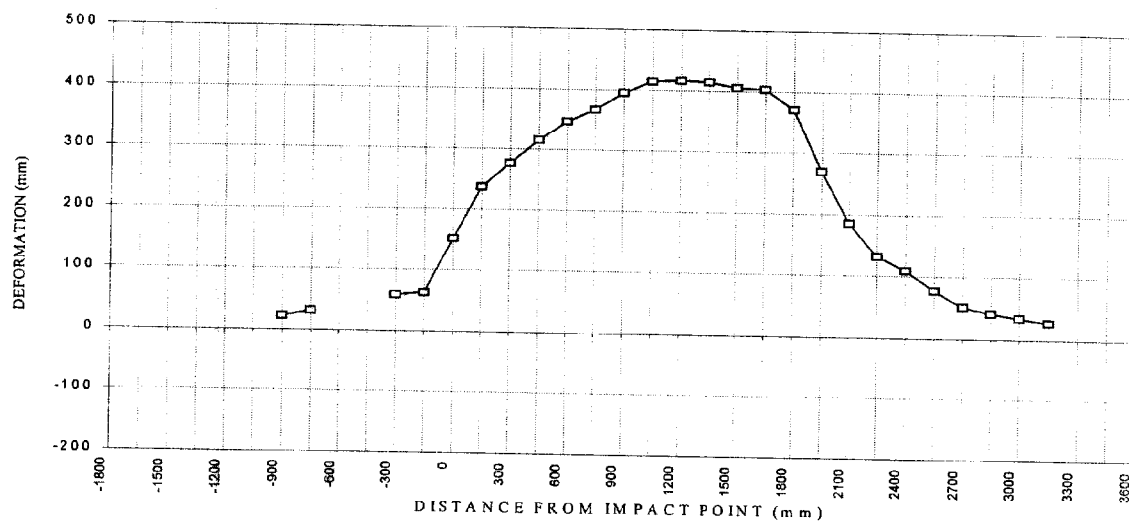
Longitudinal Distance (mm)	Level 3 - Occupant H-Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900	813	835	22
-750	789	820	31
-600			
-450			
-300	761	819	58
-150	758	820	62
0 (impact point)	755	907	152
150	753	990	237
300	752	1028	276
450	750	1065	315
600	750	1096	346
750	749	1116	367
900	747	1142	395
1050	746	1161	415
1200	745	1162	417
1350	745	1160	415
1500	745	1151	406
1650	744	1148	404
1800	743	1114	371

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 3 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	737	1006	269
2100	734	920	186
2250	738	870	132
2400	737	846	109
2550	739	816	77
2700	744	795	51
2850	753	794	41
3000	764	798	34
3150	779	806	27
3300			
3450			
3600			

Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 3 - OCCUPANT H-POINT

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050	937	955	18
-900	902	922	20
-750	870	899	29
-600	846	882	36
-450	828	867	39
-300	816	863	47
-150	810	864	54
0 (impact point)	806	879	73
150	799	922	123
300	793	956	163
450	788	991	203
600	784	1013	229
750	782	1035	253
900	778	1066	288
1050	780	1103	323
1200	778	1089	311
1350	777	1058	281
1500	777	1033	256
1650	777	996	219
1800	778	964	186

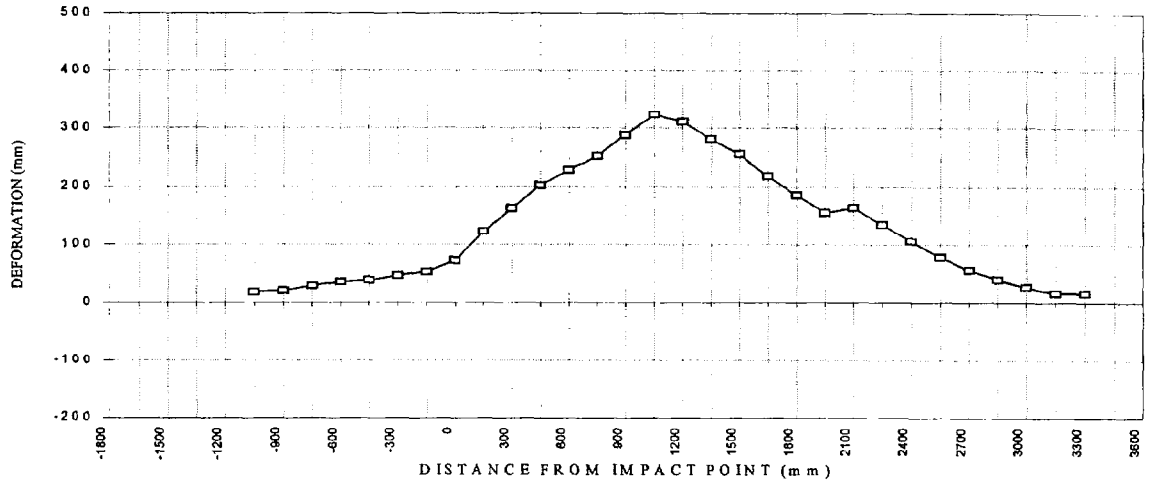
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	777	933	156
2100	778	942	164
2250	782	918	136
2400	787	893	106
2550	793	872	79
2700	800	857	57
2850	807	848	41
3000	815	842	27
3150	826	843	17
3300	840	857	17
3450			
3600			

Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 4 - WINDOW SILL

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450	1047	1106	59
600	1034	1105	71
750	1028	1116	88
900	1023	1071	48
1050	1023	1026	3
1200	1022	983	-39
1350	1020	940	-80
1500	1019	898	-121
1650	1019	857	-162
1800	1018	820	-198

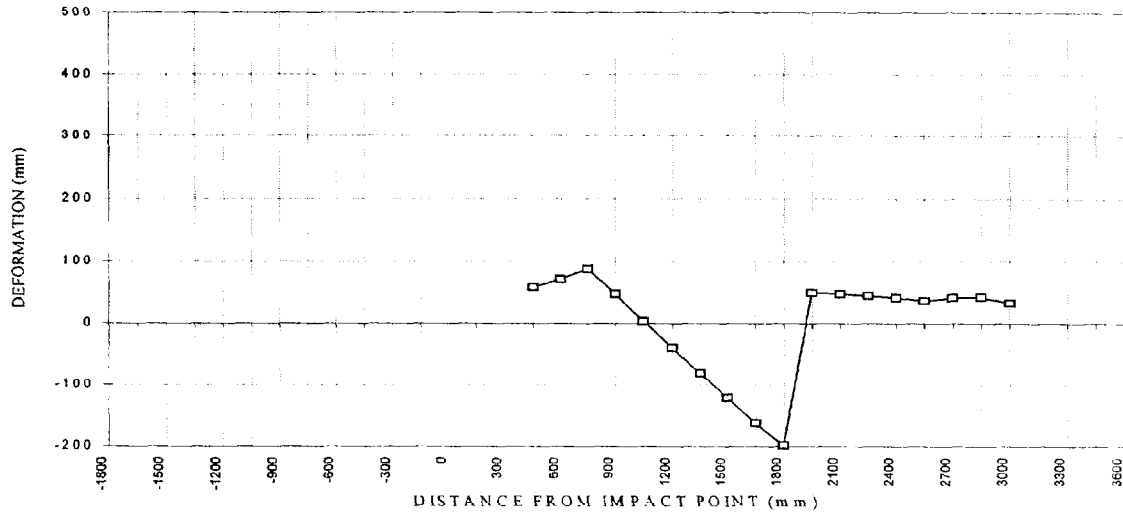
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	1017	1067	50
2100	1017	1065	48
2250	1019	1064	45
2400	1023	1065	42
2550	1028	1065	37
2700	1030	1072	42
2850	1038	1081	43
3000	1052	1085	33
3150			
3300			
3450			
3600			

Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH



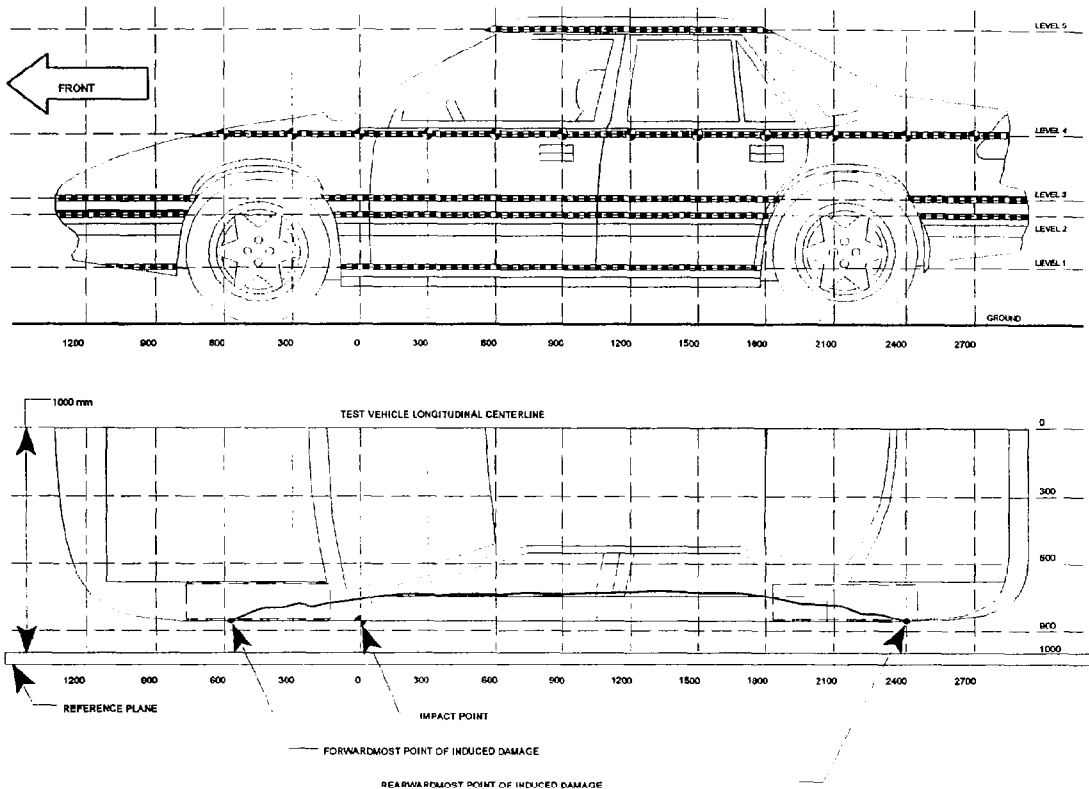
LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

NHTSA NO.: MX0307 Test Date: December 18, 1998



NOTE: All measurements are in millimeters (mm)

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = <u>-750</u> mm)	820	789	31
2. <u>-10</u> mm	957	755	202
3. <u>675</u> mm	1193	805	388
4. <u>1355</u> mm	1191	801	390
5. <u>2145</u> mm	1051	734	317
6. (LR = <u>2850</u> mm)	794	753	41

DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

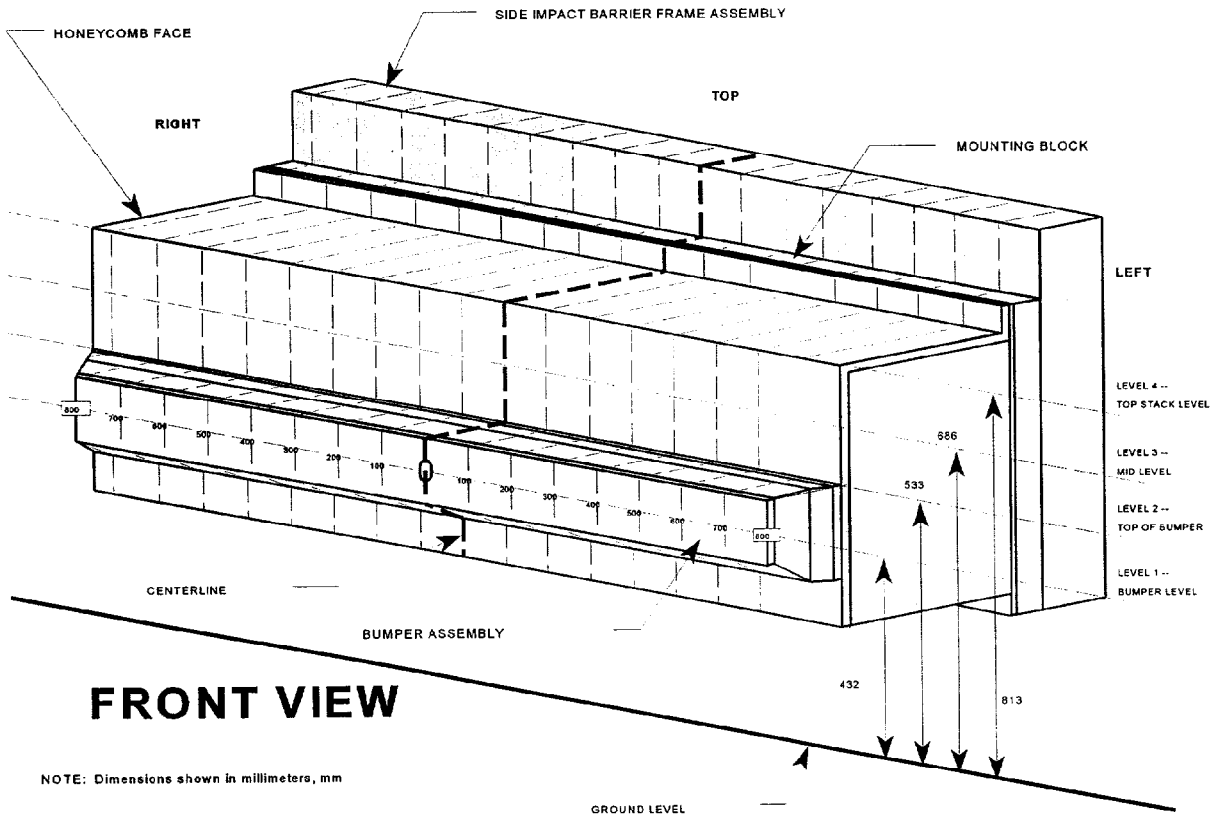
Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

Location	Height at CL	Distance Right of Center (mm)									Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	95	48	34	25	22	20	24	29	28	32	38	40	49	66	91	120	153
Mid Level Level 3	686 mm	29	27	16	11	6	7	9	9	14	11	11	13	15	19	28	49	83
Top Bumper Level 2	533 mm	63	56	51	50	30	34	33	45	46	44	40	35	47	55	59	59	64
Mid Bumper Level 1	432 mm	48	90	78	70	70	69	70	70	70	68	63	52	54	54	55	57	63

See next page for Barrier Face Graphic

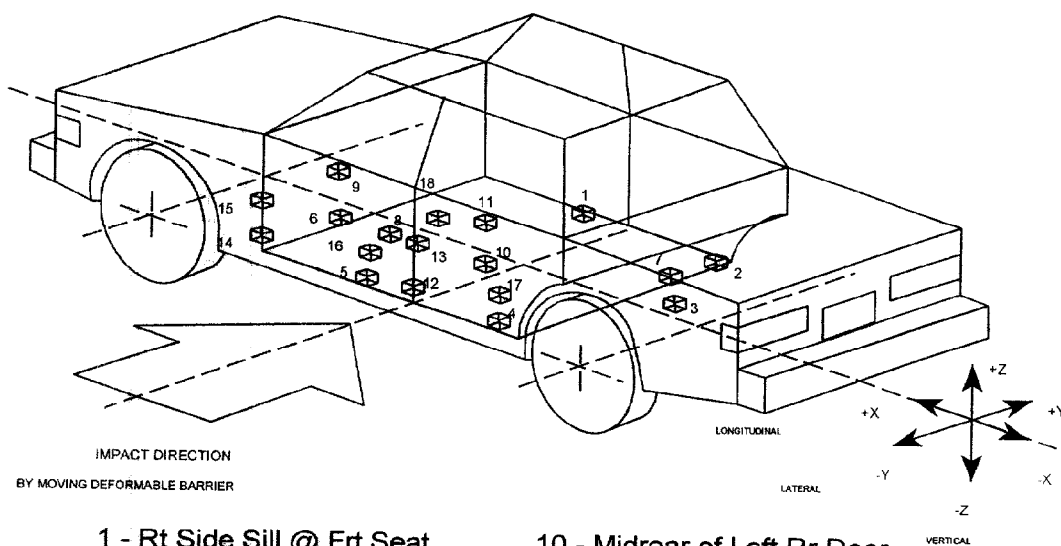
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998



- 1 - Rt Side Sill @ Frt Seat
- 2 - Rt Side Sill @ Rr Seat
- 3 - Rr Floorpan Above Axle
- 4 - Left Side Sill @ Rr Seat
- 5 - Left Side Sill @ Frt Seat
- 6 - Left Frt Door on Centerline
- 7 - Rt Rr Occ Compartment
- 8 - Midrear of Left Frt Door
- 9 - Left Frt Door Up C/Line

- 10 - Midrear of Left Rr Door
- 11 - Left Rr Door Up C/Line
- 12 - Left Lwr B-Post
- 13 - Left Middle B-Post
- 14 - Left Lwr A-Post
- 15 - Left Middle A-Post
- 16 - Frt Seat Track
- 17 - Rr Seat Track
- 18 - Vehicle C.G.

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

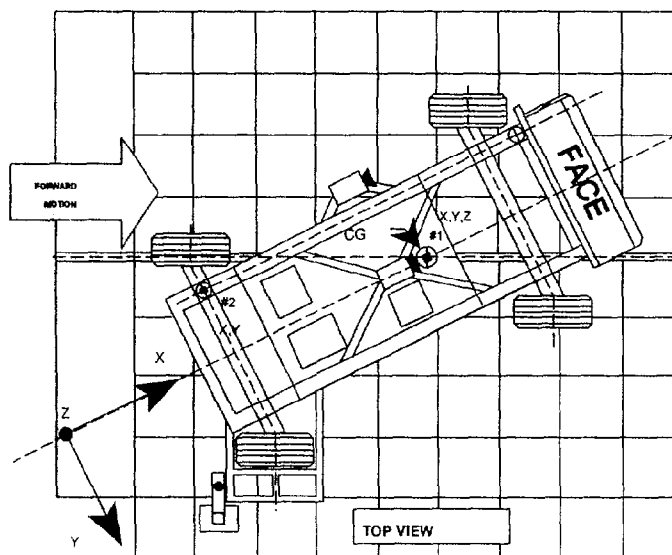
Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Rt. Side Sill @ Front Seat	3165	683	267	4.0	-5.7	19.1	-2.7	4.8	-5.1	19.7
2	Rt. Side Sill @ Rear Seat	2044	692	307	4.1	-5.0	27.2	-3.2	5.0	-6.3	27.4
3	Rr. Floorpan Above Axle	1084	0	480	2.7	-7.7	19.2	-2.5	26.8	-24.0	27.9
4	Left Side Sill @ Rr. Seat	1992	-692	240	---	---	73.5	-69.3	---	---	---
5	Left Side Sill @ Frt. Seat**	3179	-683	273	---	---	54.7	-10.7	---	---	---
6	Left Front Door Centerline	3211	-817	670	---	---	121.1	-58.9	---	---	---
7	Right Rear Occupant Compartment	2096	420	465	---	---	21.5	-2.2	---	---	---
8	Mid Rear of Left Front Door	2745	-829	660	---	---	261.3	-119.1	---	---	---
9	Left Front Door Upper Centerline	3194	-798	913	---	---	176.6	-191.8	---	---	---
10	Left Rear Door Mid Rear	1842	-873	753	---	---	152.8	-118.8	---	---	---
11	Left Rear Door Upper Centerline	2170	-860	998	---	---	141.3	-55.0	---	---	---
12	Left Lower B-Post	2623	-855	427	---	---	142.7	-34.4	---	---	---
13	Left Mid B-Post	2586	-852	1030	---	---	97.8	-48.1	---	---	---
14	Left Lower A-Post	3589	-800	377	---	---	81.5	-20.0	---	---	---
15	Left Mid A-Post	3608	-822	920	---	---	27.8	-3.8	---	---	---
16	Driver Left Seat Track	2768	-640	503	---	---	103.3	-30.9	---	---	---
17	Rear Seat Track	1821	-297	522	---	---	83.3	-77.5	---	---	---
18	Vehicle CG	2765	0	414	4.4	-11.5	20.2	-3.8	11.6	-8.4	22.3

*Reference: X - Rear Bumper (+ Forward) Y - Vehicle Centerline (+ To right) Z - Ground Level (+ Up)

** Data not valid after approximately 63 msec.

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1999/Dodge/Grand CaravanVehicle NHTSA No.: MX0307 Test Date: December 18, 1998

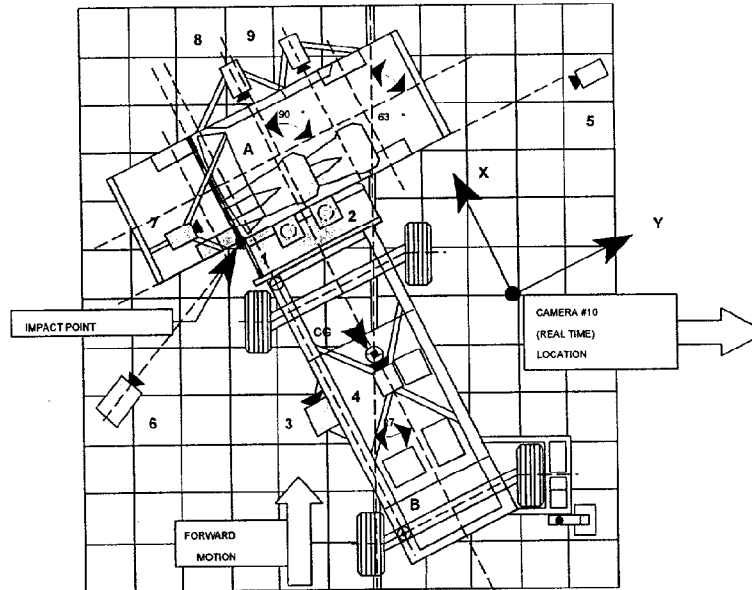
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.5	129	-18.5	43
	Lateral (Y)	---	---	---	0.9	66	-8.0	39
	Vertical (Z)	---	---	---	15.9	17	-14.4	21
	Resultant (R)	---	---	---	21.5	16	---	---
2	Rear Frame Member	-2501	-625	622				
	Longitudinal (X)	---	---	---	1.3	190	-22.4	39
	Lateral (Y)	---	---	---	7.0	28	-1.3	80

*Reference: X - Front Axle (+ Forward)
Y - Vehicle Centerline (+ To right)
Z - Ground Level (+ Up)

DATA SHEET NO. 15
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998



Camera No.	View	Coordinates (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
	Real Time					
1	Top Overall	-160	1280	5000	8	943
2	Top Impact	-215	40	5000	13	893
3	Cart Pointer				35	1010
4	Cart Overall				13	1005
5	Right Impact	-535	-10450	1740	13	1000
6	Left Impact	-345	2705	1660	13	1000
7	Onboard Hood				13	1000
8	Onboard Driver				8	1064
9	Onboard Rear Passenger				8	962

* Reference: (from point of impact)

+X = Forward

+Y = To Right

+Z = Upward

DATA SHEET 16
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

TEST REQUIREMENTS:

Drain the test vehicle's fuel system and operate the engine until the fuel system is dry. Add Stoddard solvent, which has been dyed purple, until 92-94% of the stated usable capacity is reached. Operate the engine to assure the Stoddard solvent is present throughout the entire fuel system.

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 38.4 mph (61.8 kph)

FUEL SPILLAGE MEASUREMENT:

POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0 oz.	1 oz
2. For 5 minute period after vehicle motion ceases	0 oz.	5 oz
3. For next 25 minutes	0 oz.	1 oz./1 min

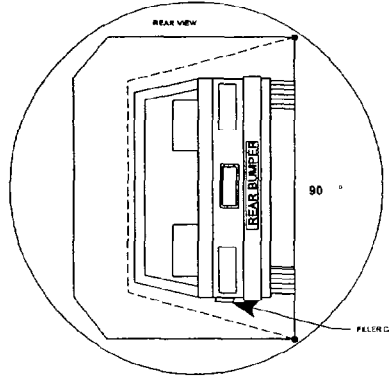
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 46 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 46 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	Trace	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

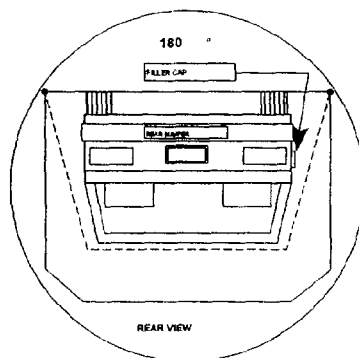
FUEL SPILLAGE LOCATIONS(S): Fuel filler door

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 29 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 29 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	Trace	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

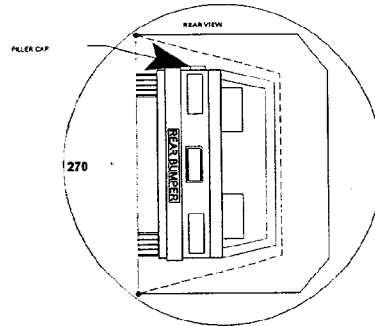
FUEL SPILLAGE LOCATIONS(S): Collected from roof after running from fuel filler door.

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 14 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 14 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	Trace	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

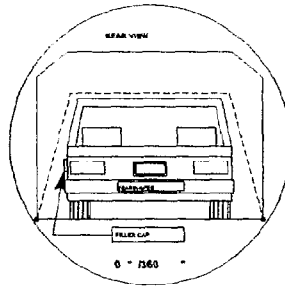
FUEL SPILLAGE LOCATIONS(S): Collected from passenger side sill.

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Dodge/Grand Caravan

Vehicle NHTSA No.: MX0307 Test Date: December 18, 1998

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 37 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 37 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

270° TO 360° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0.7 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

FUEL SPILLAGE LOCATIONS(S): Collected from driver side sill.

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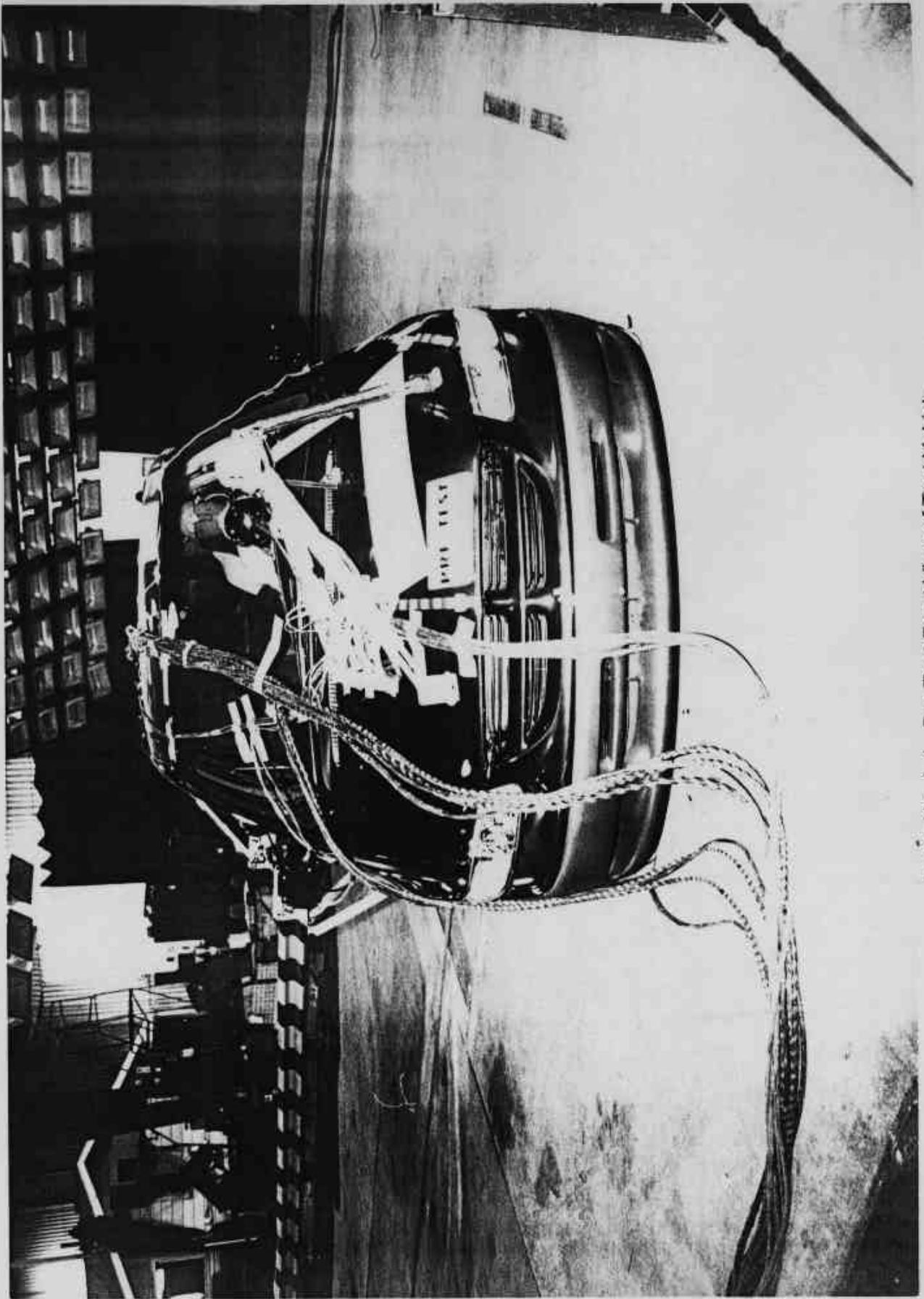


Photo No. A-1 - Pre-Test Front View of Test Vehicle



Photo No. A-2 - Post-Test Front View of Test Vehicle

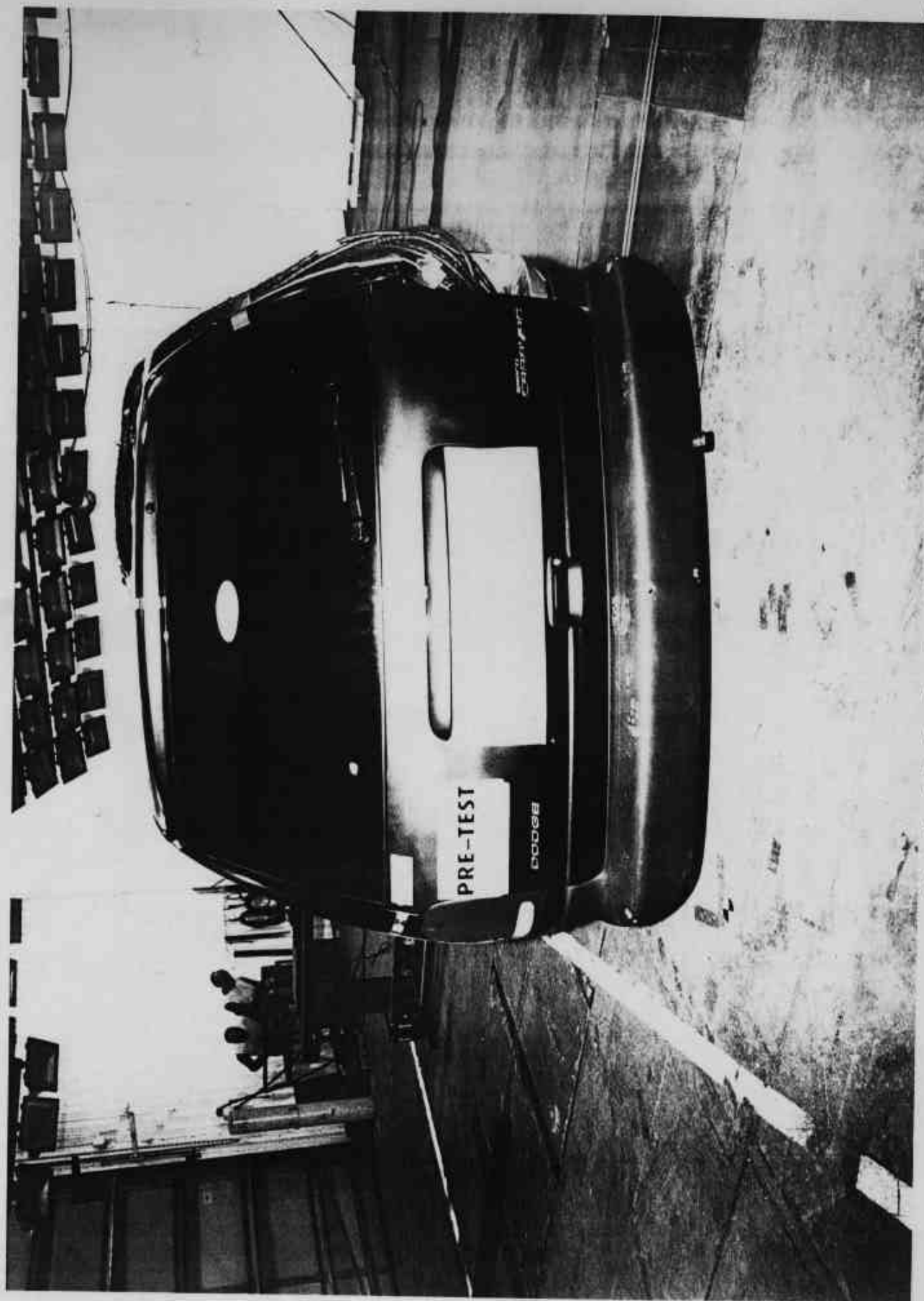


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

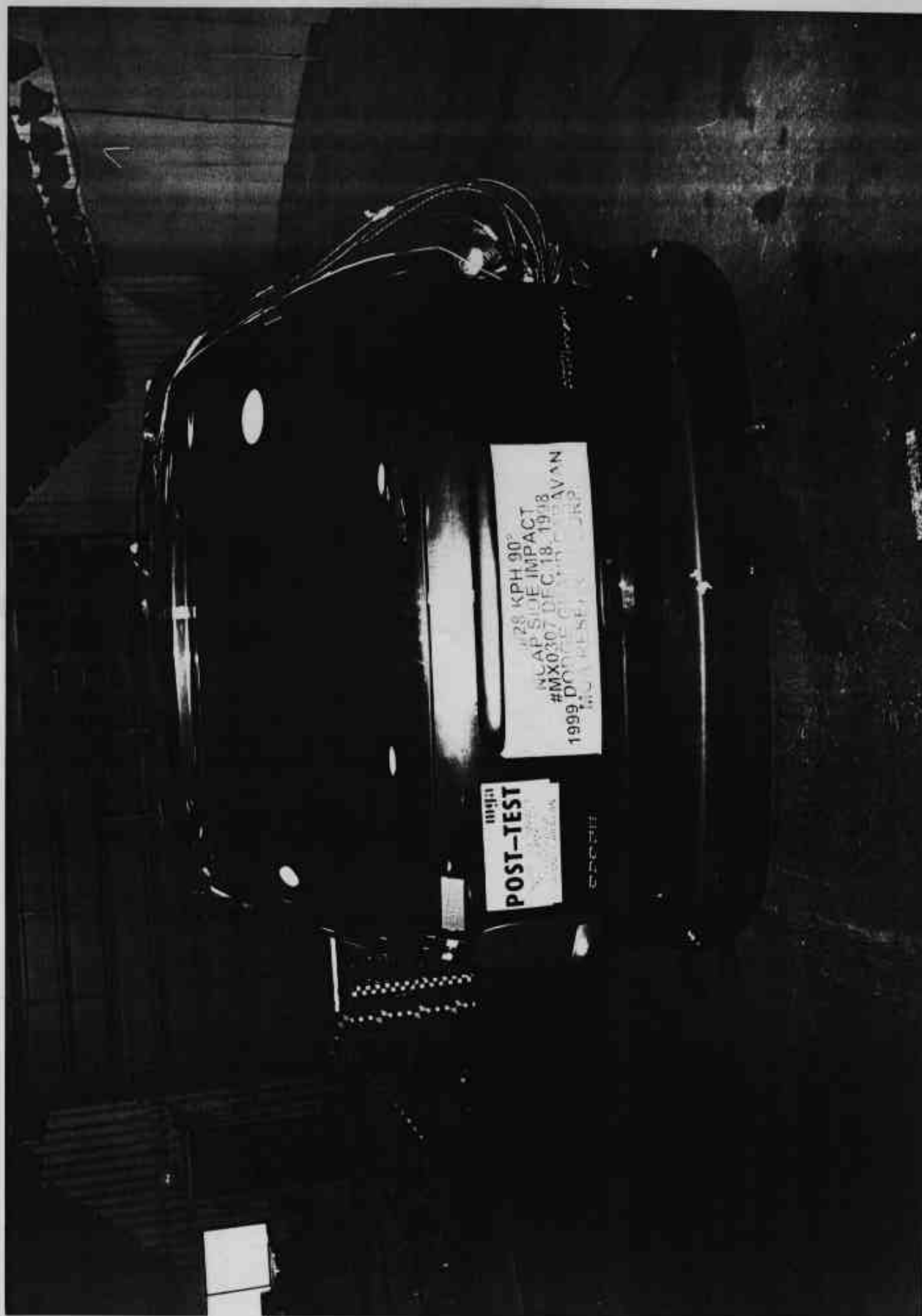


Photo No. A-4 - Post-Test Rear View of Test Vehicle

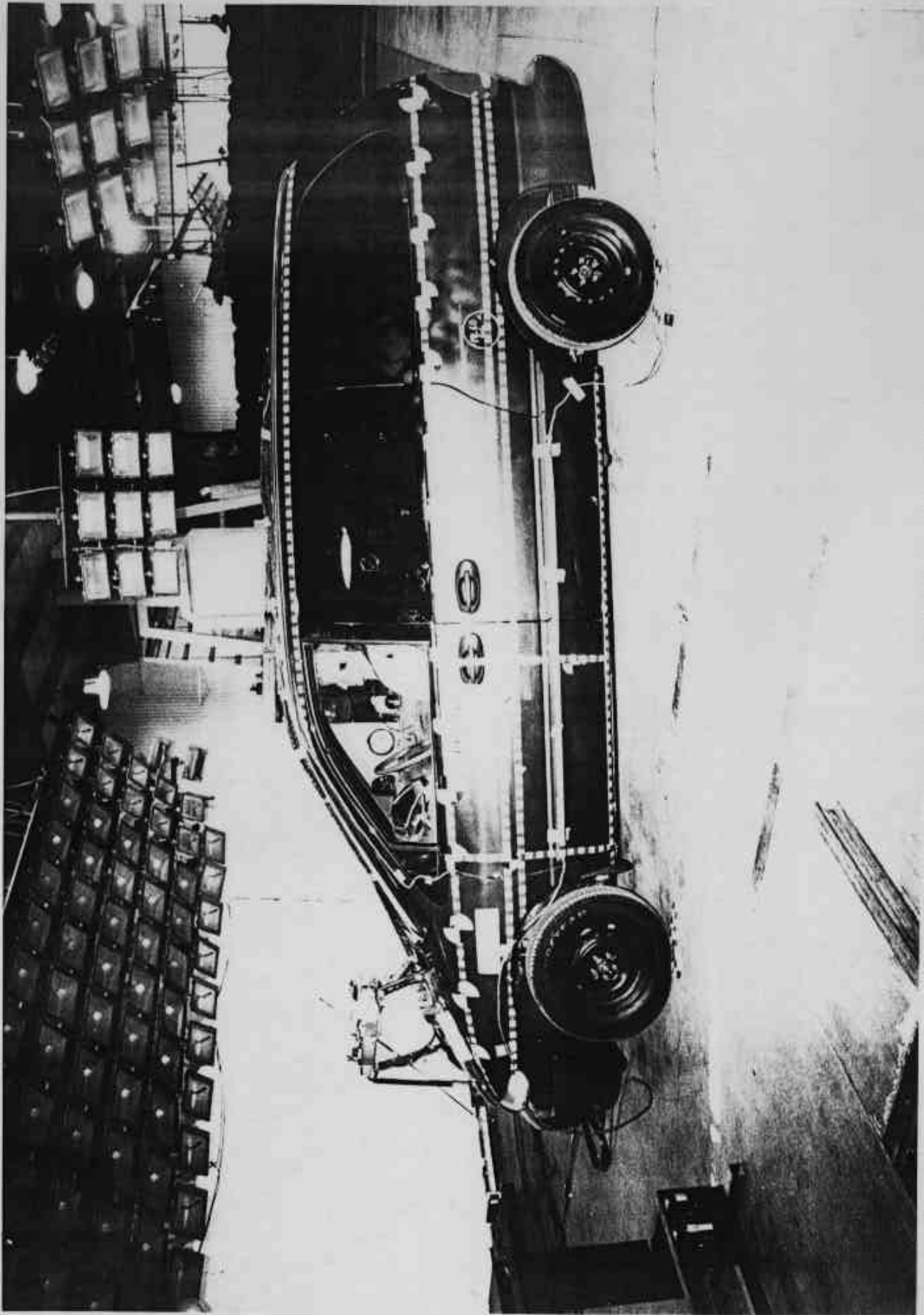


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

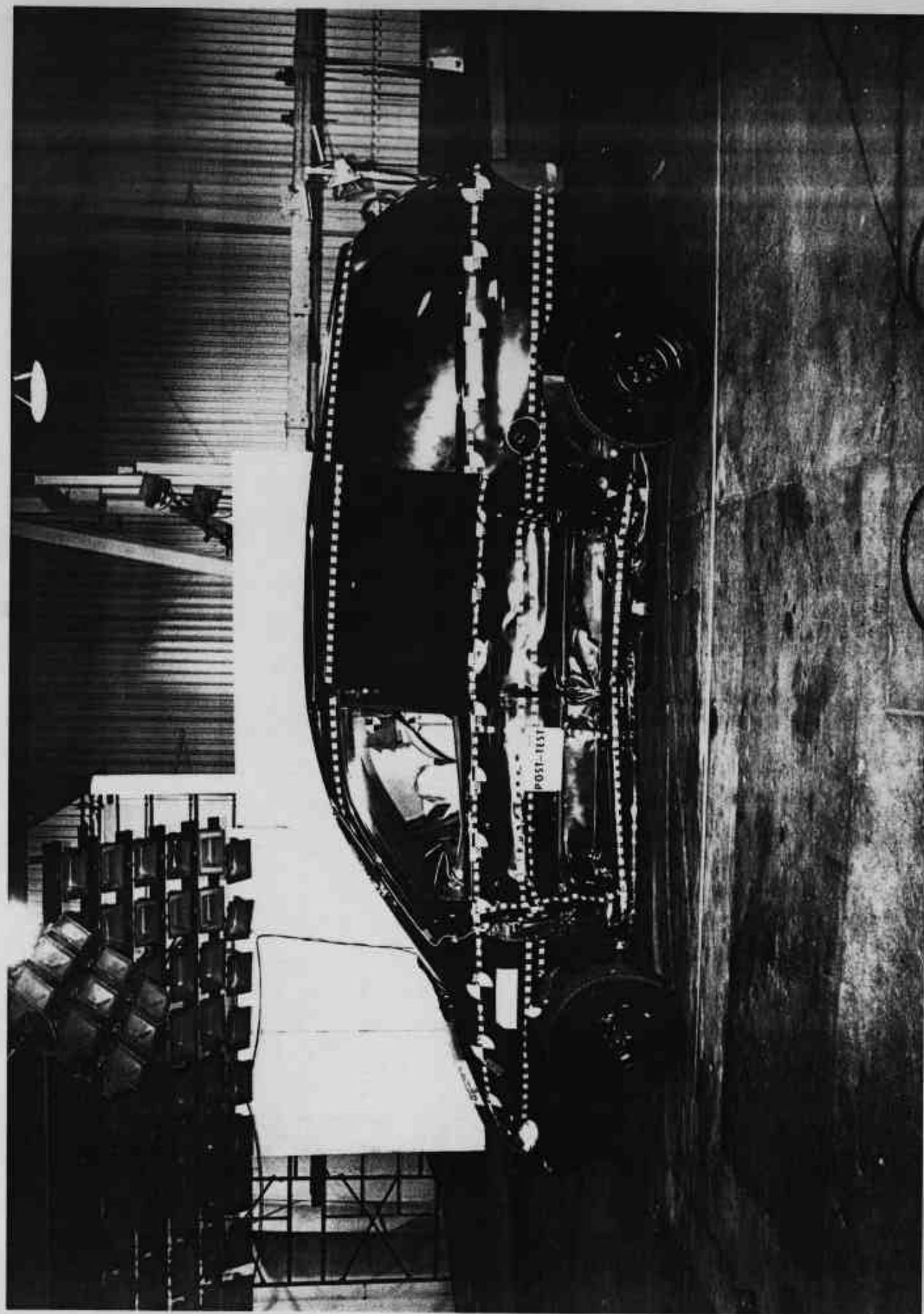


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

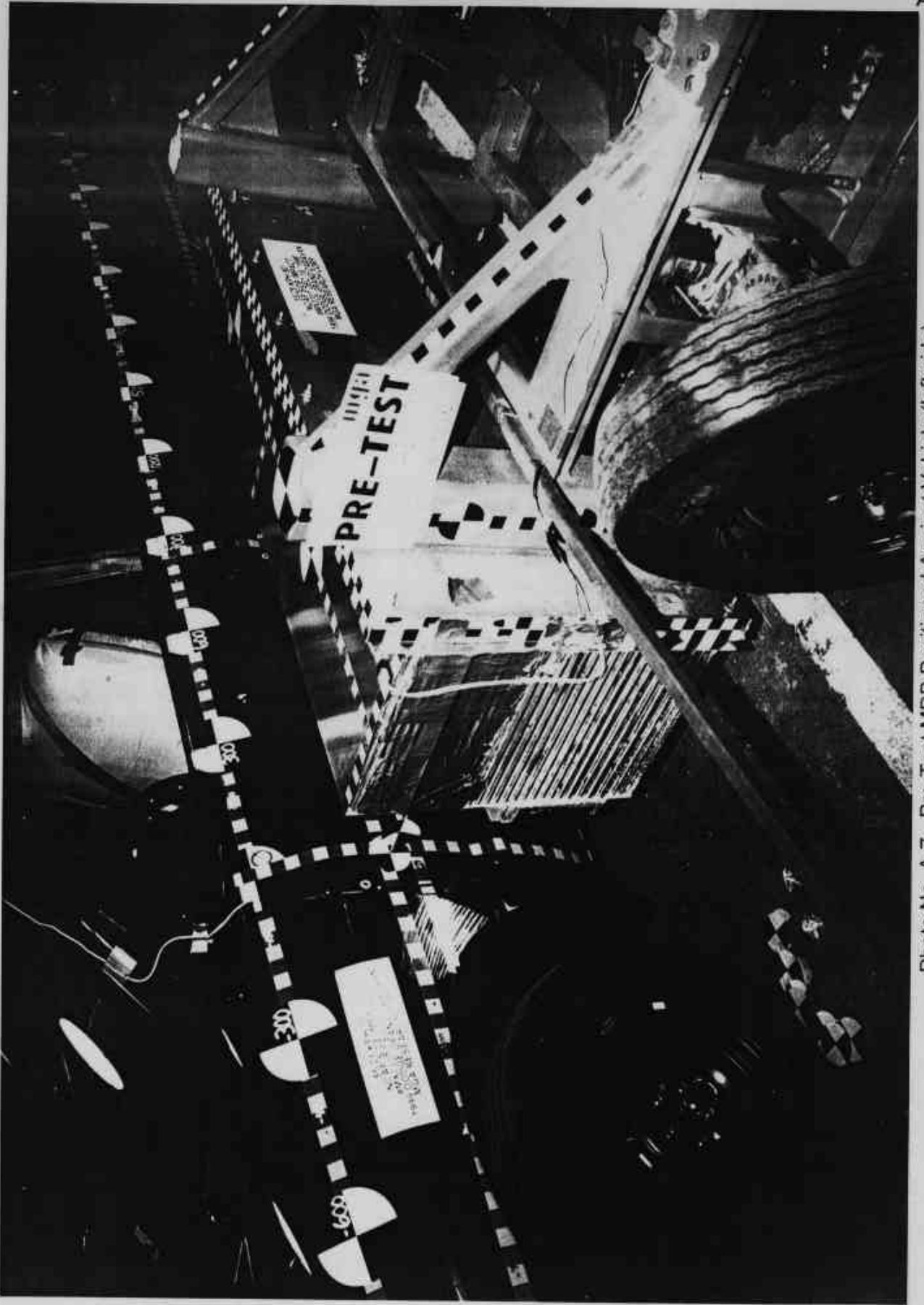


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

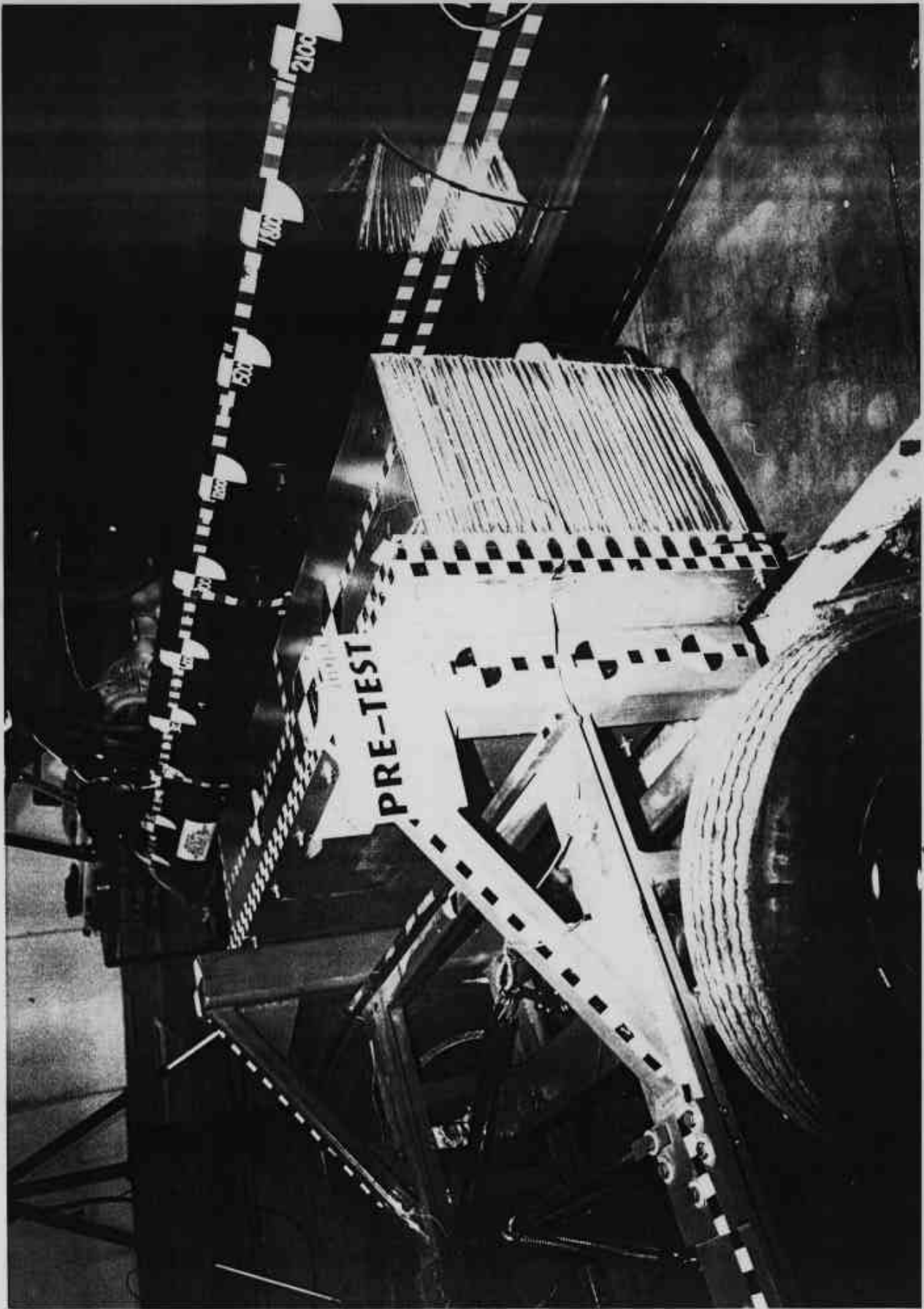


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

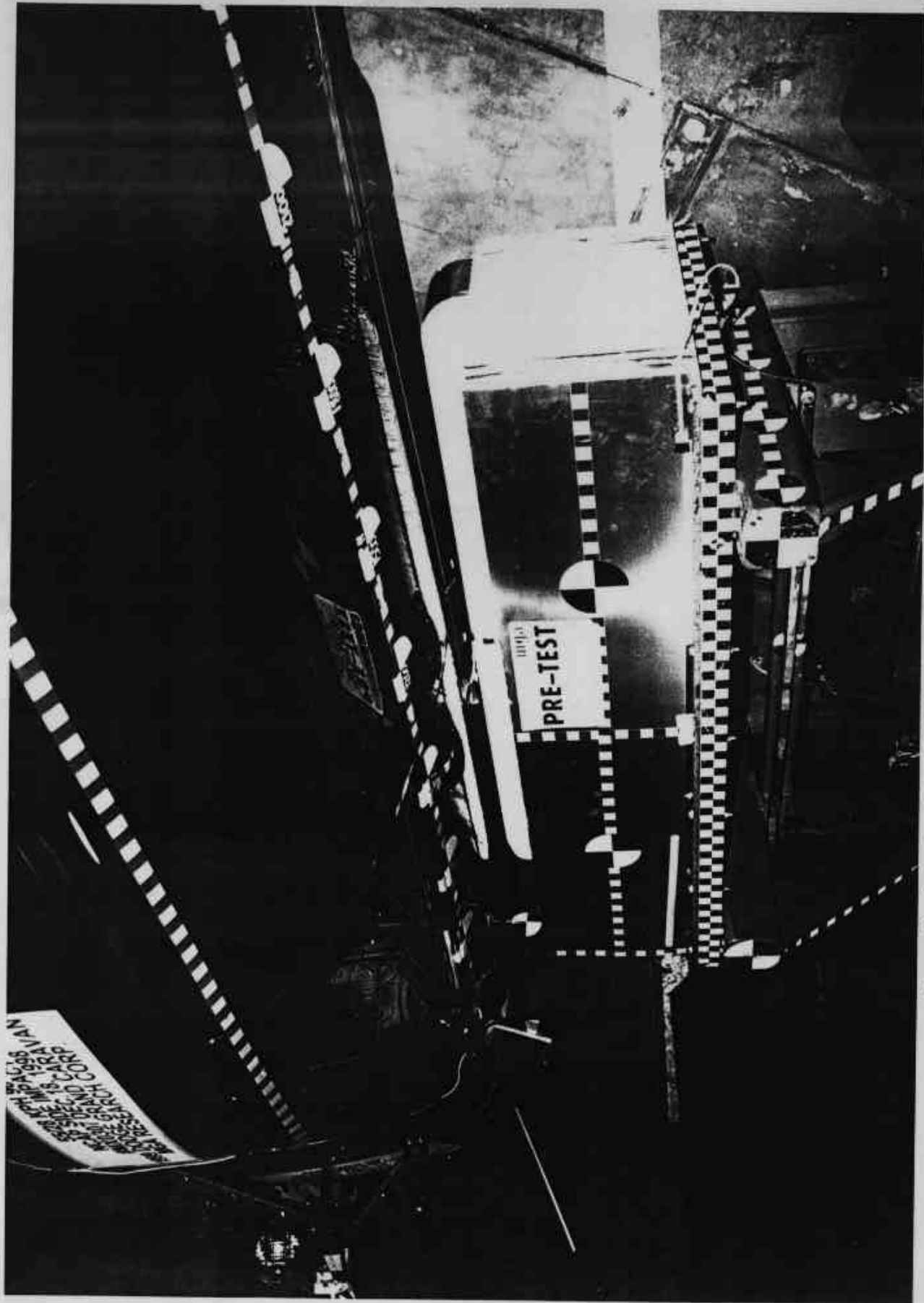


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

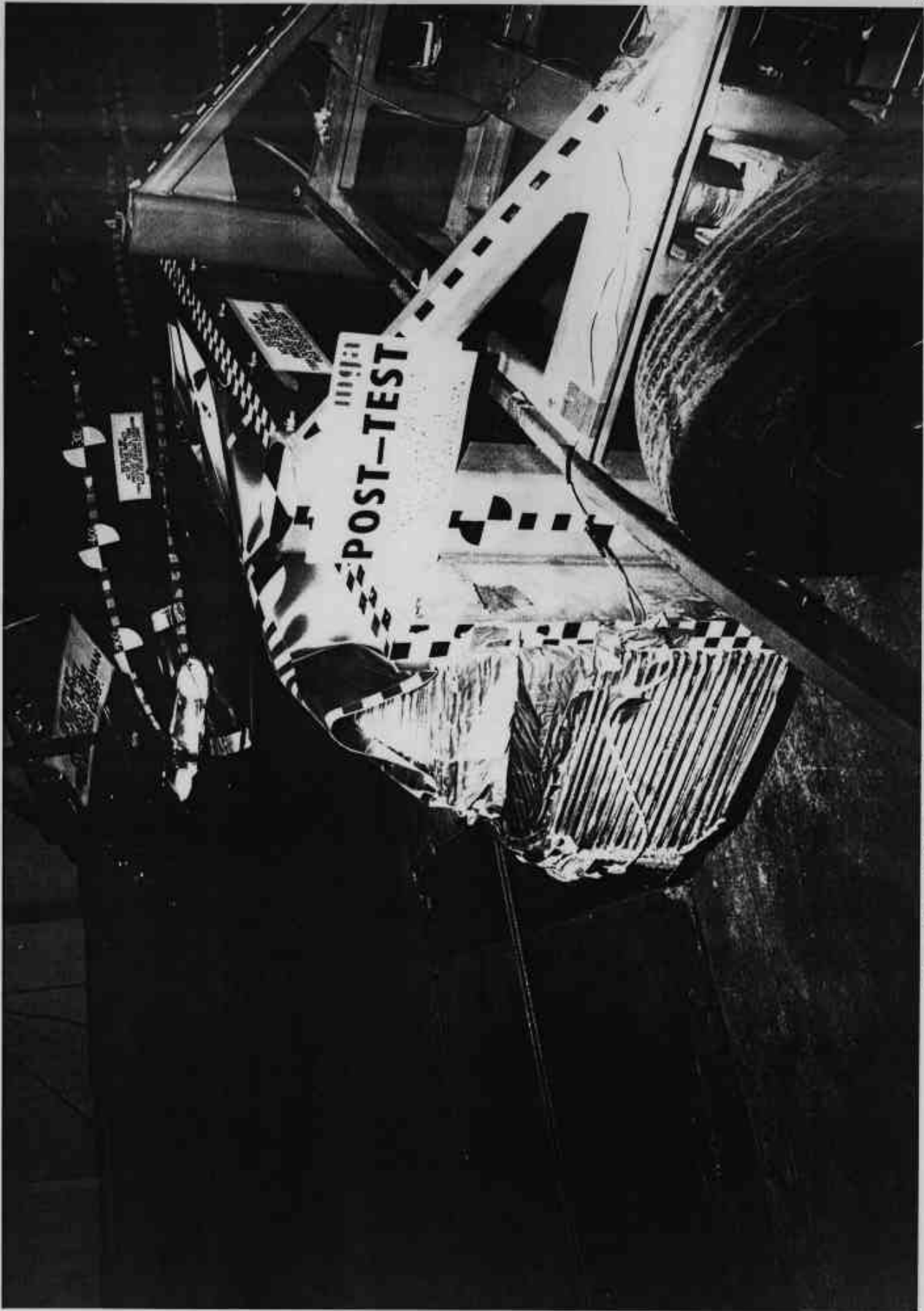


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

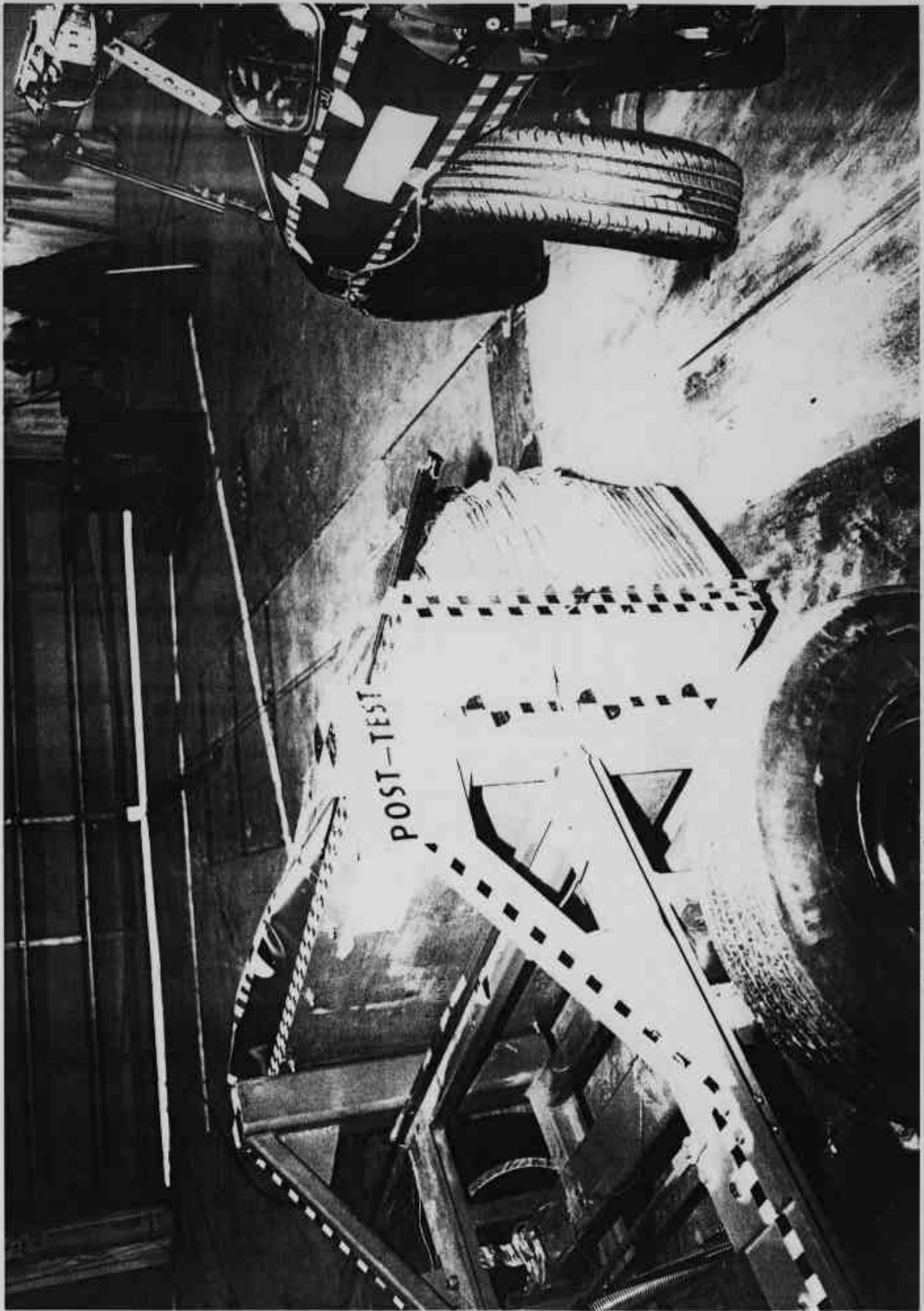


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

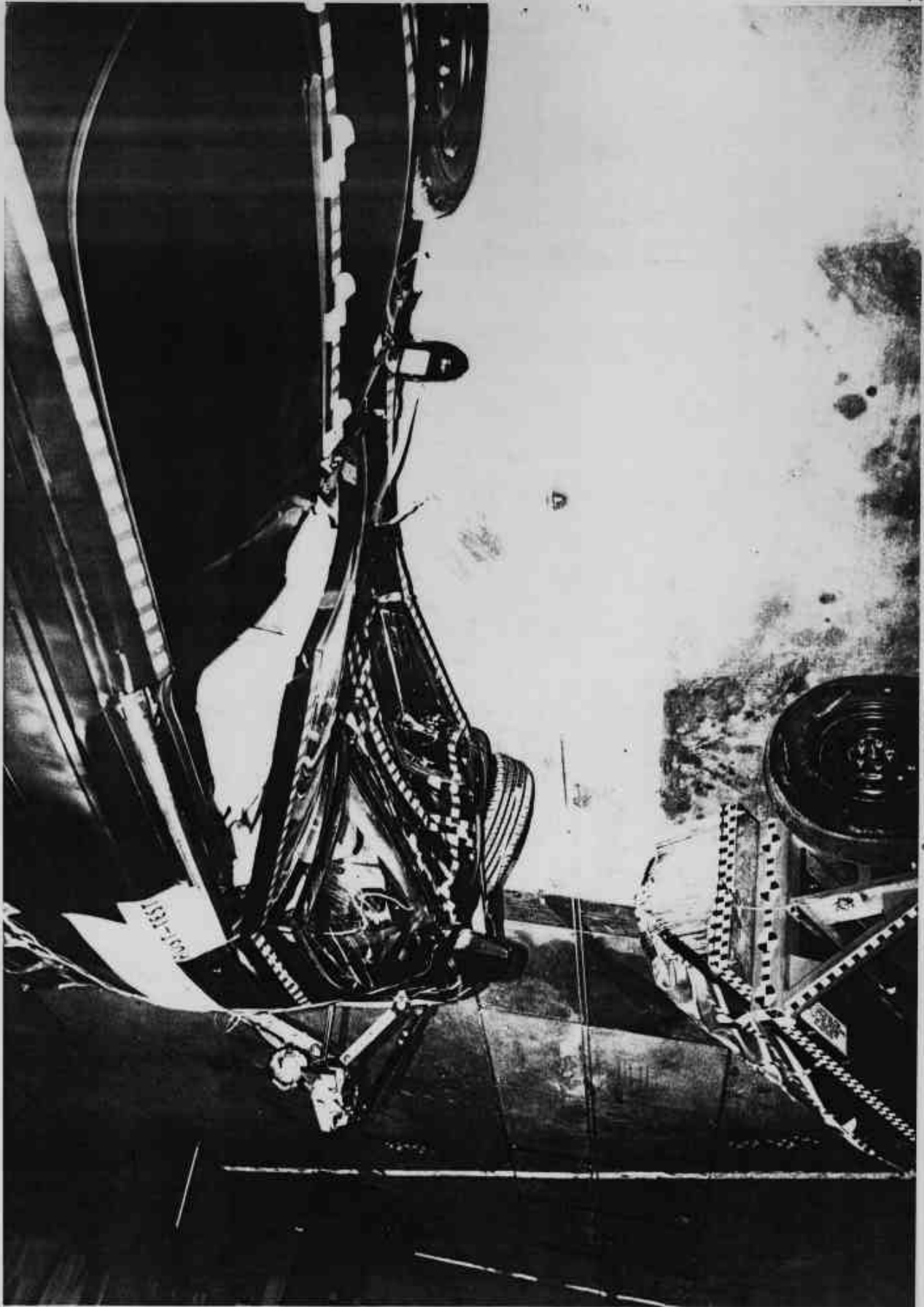


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View

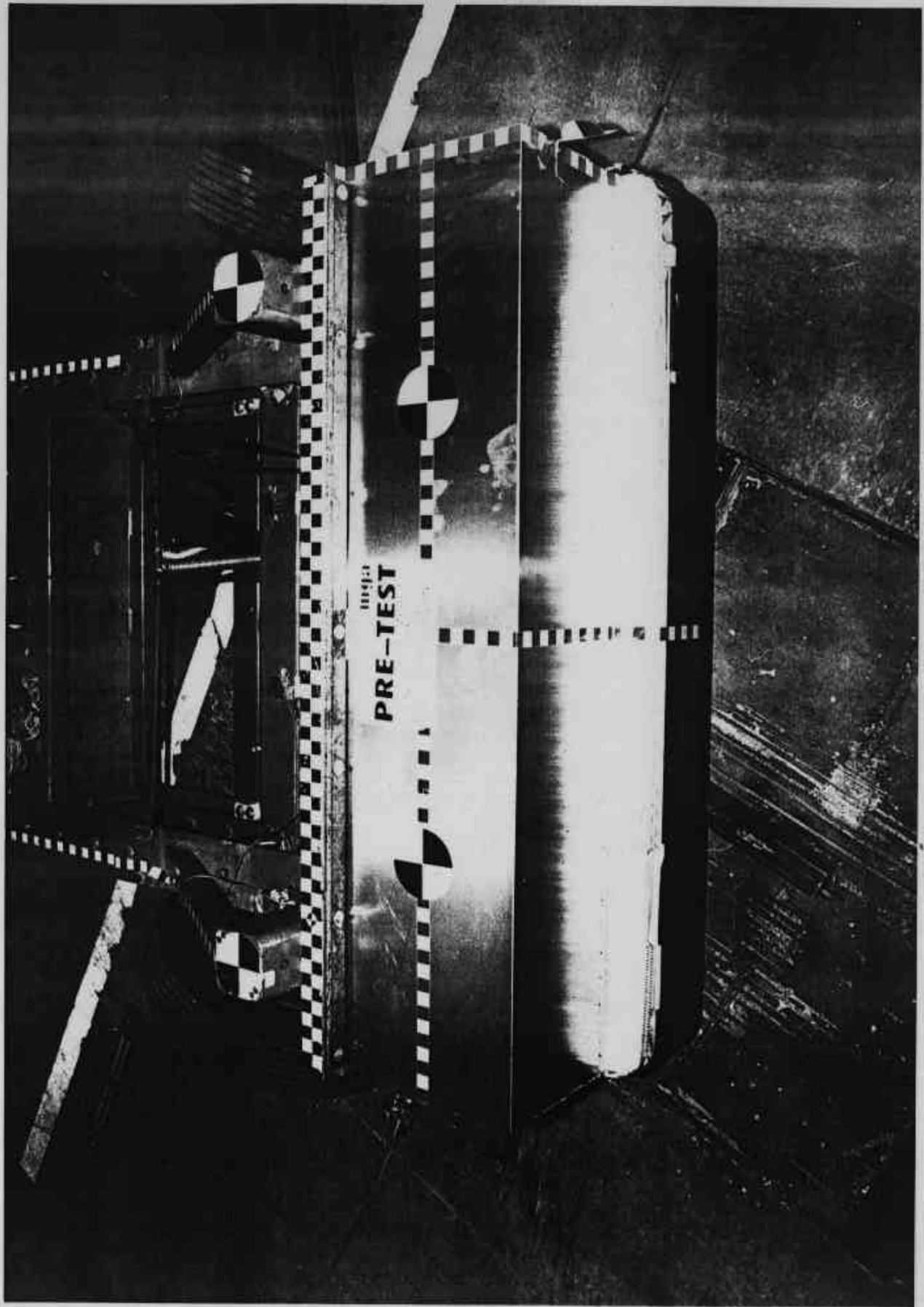


Photo No. A-13 - Pre-Test MDB Top View

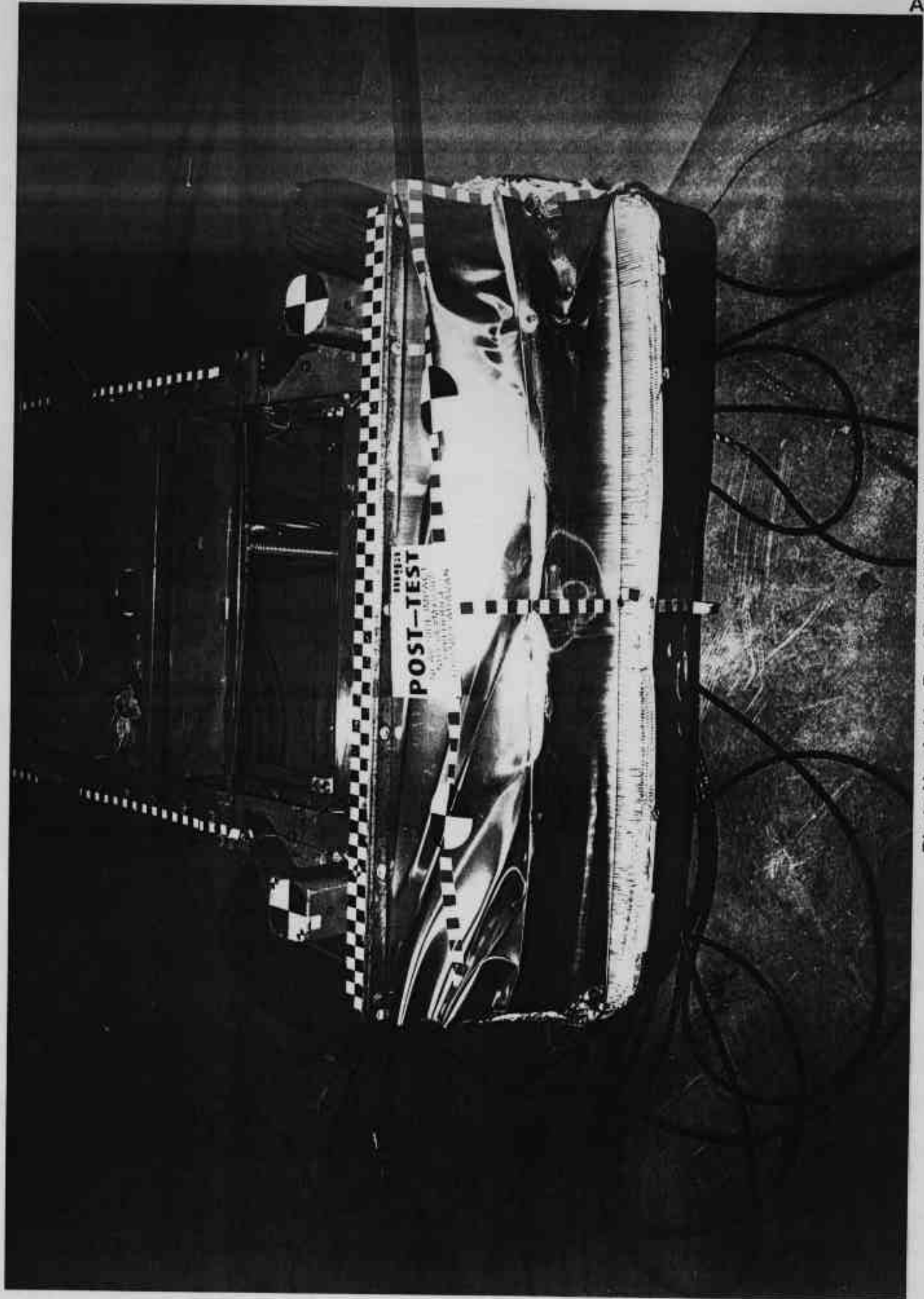


Photo No. A-14 - Post-Test MDB Top View

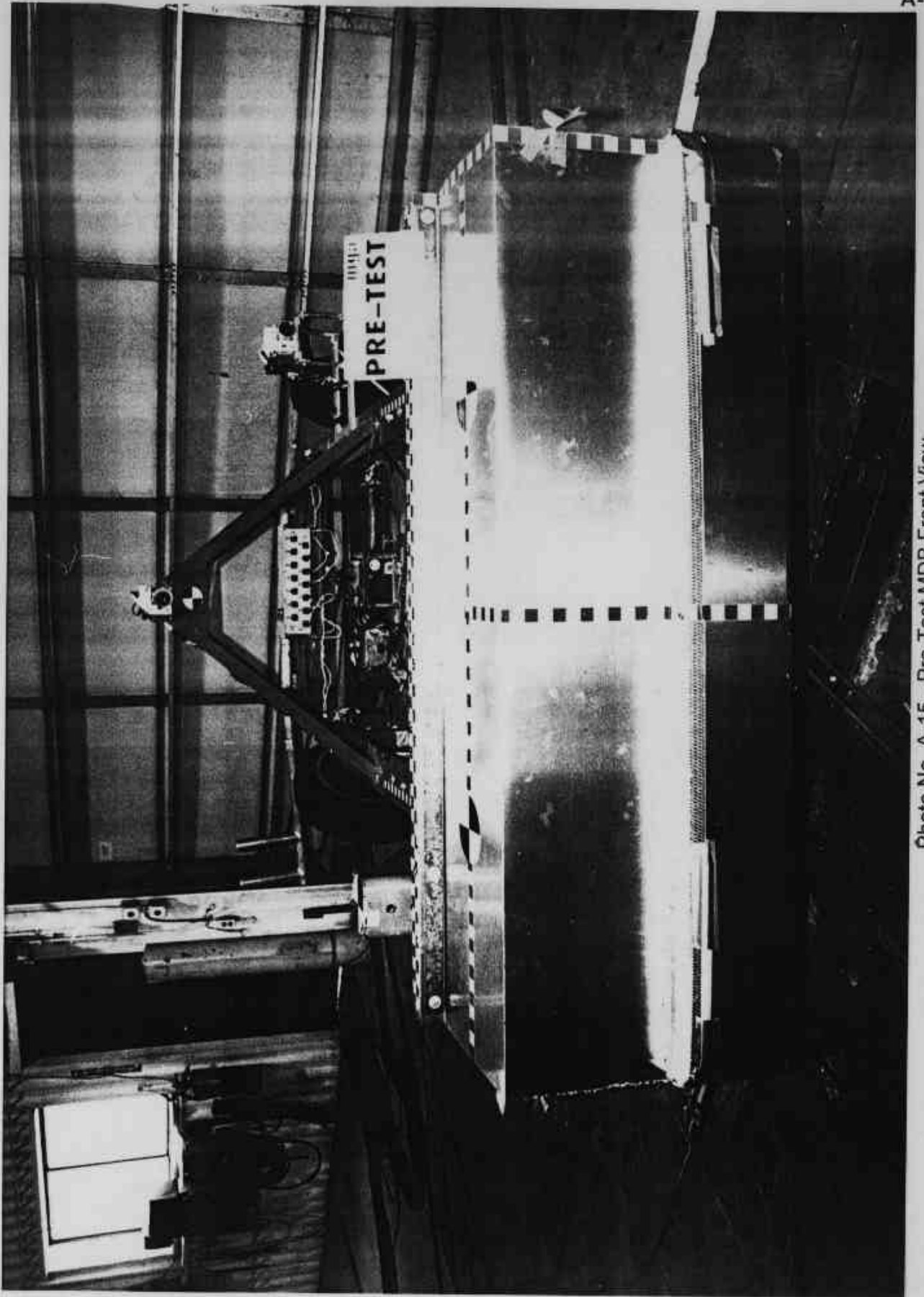


Photo No. A-15 - Pre-Test MDB Front View

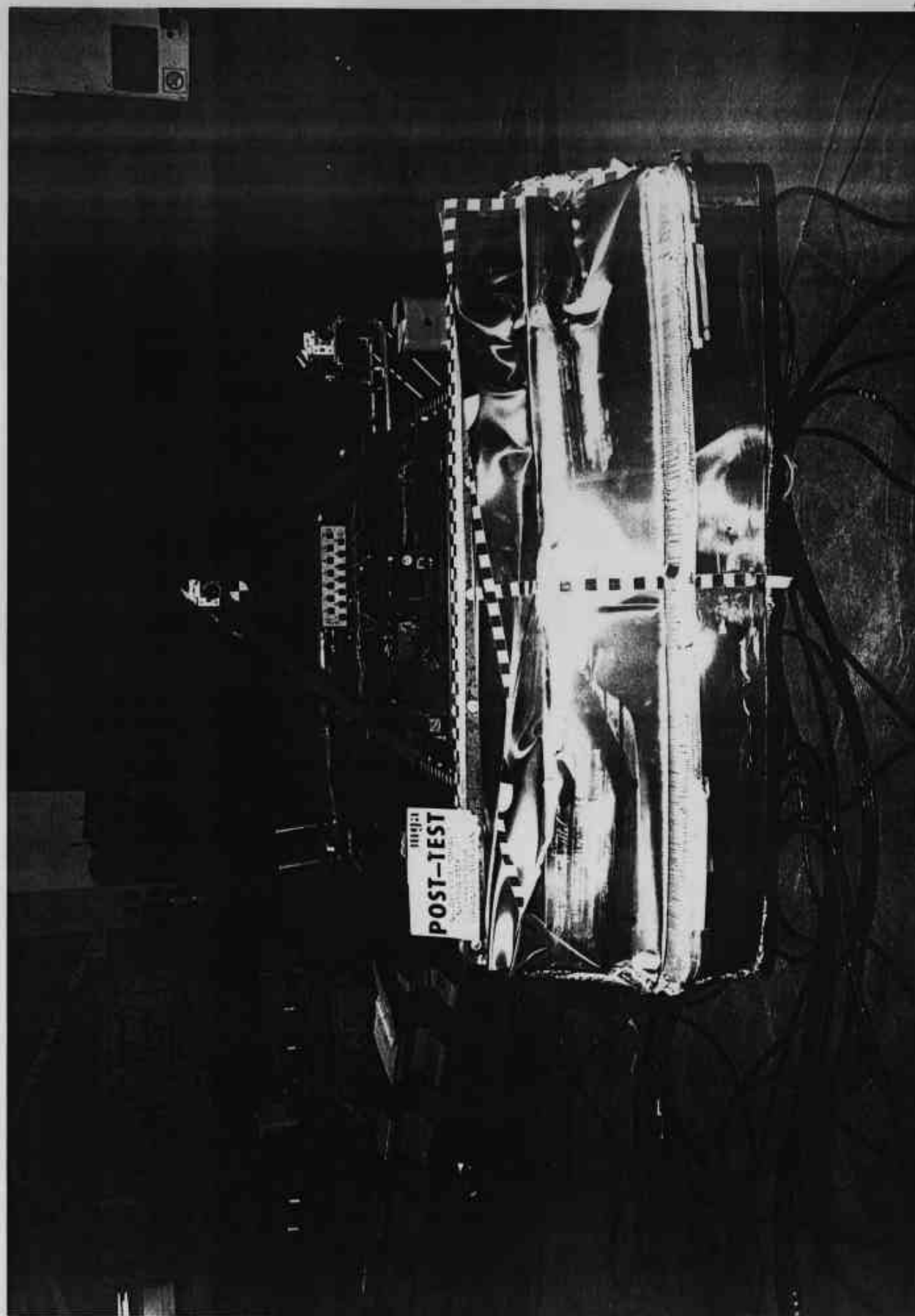


Photo No. A-16 - Post-Test MDB Front View

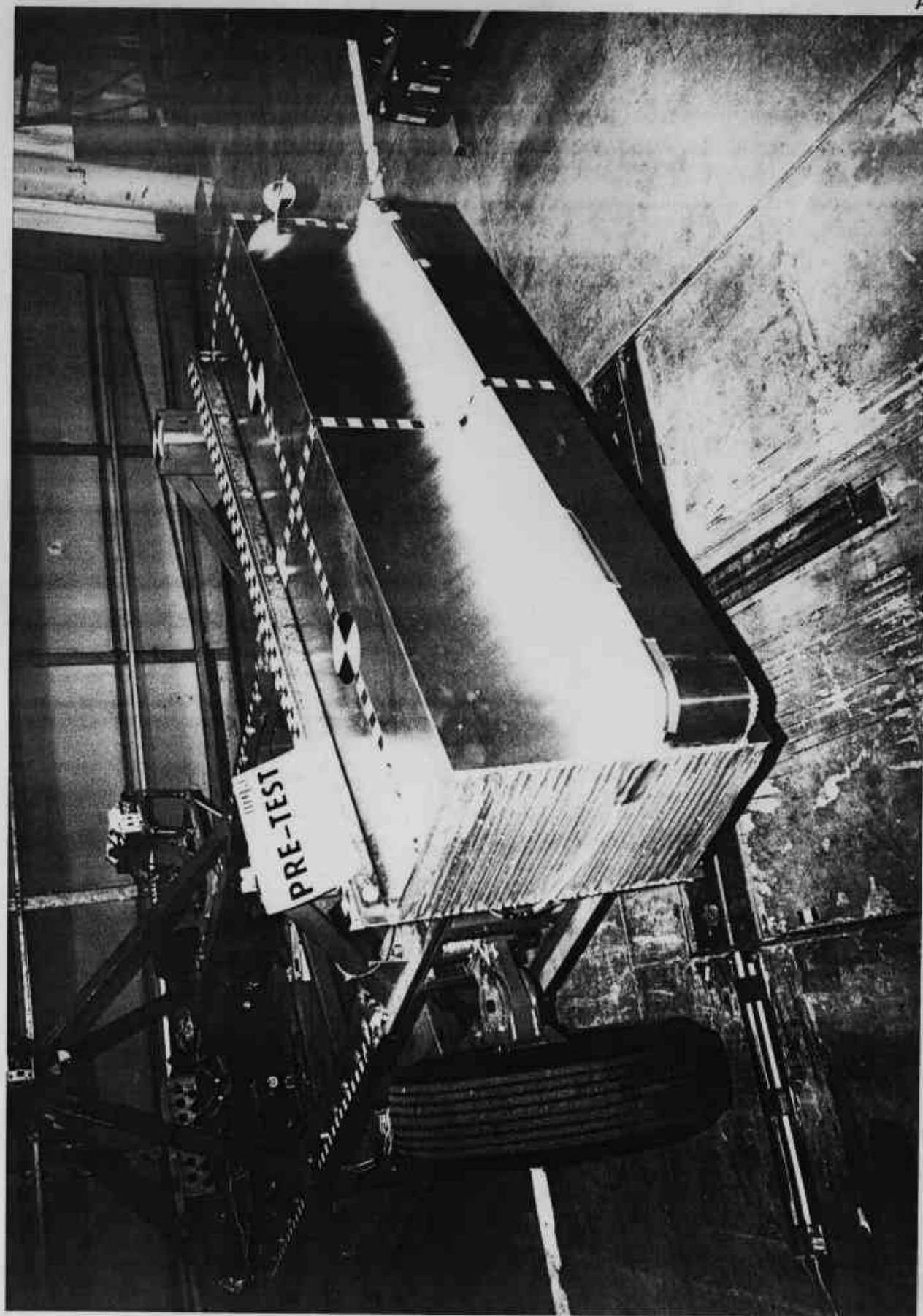


Photo No. A-17 - Pre-Test MDB Right Side View

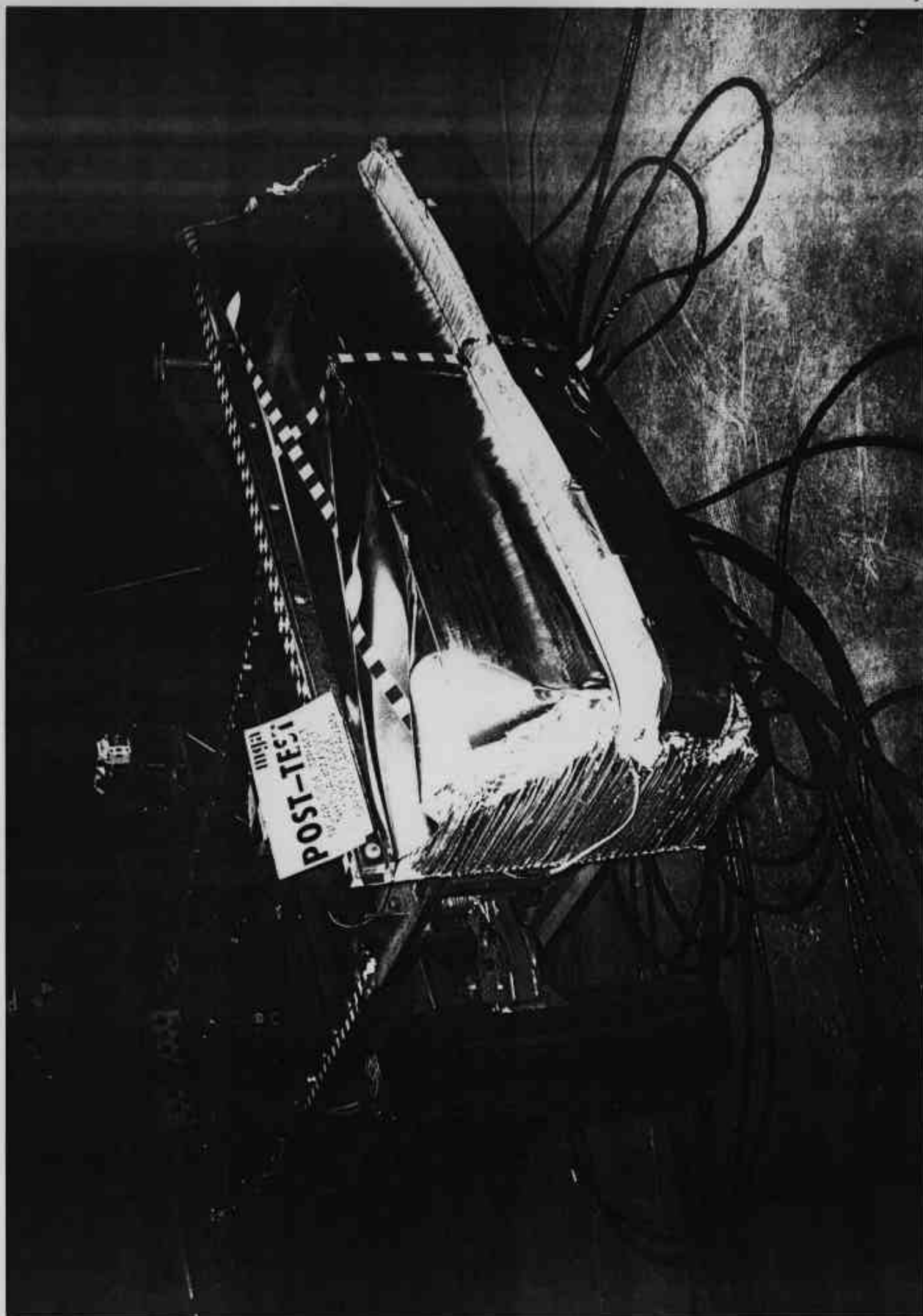


Photo No. A-18 - Post-Test MDB Right Side View

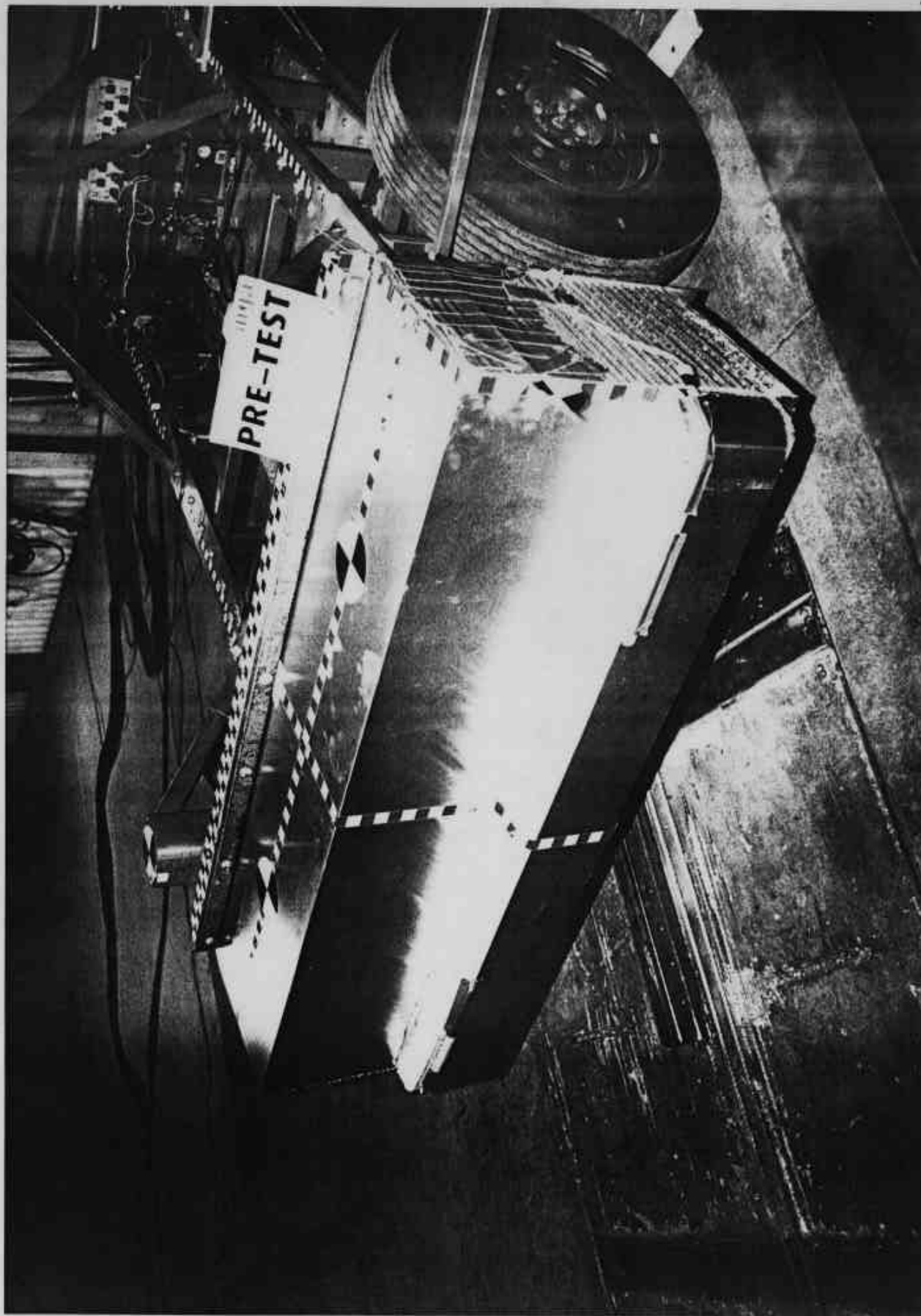


Photo No. A-19 - Pre-Test MDB Left Side View

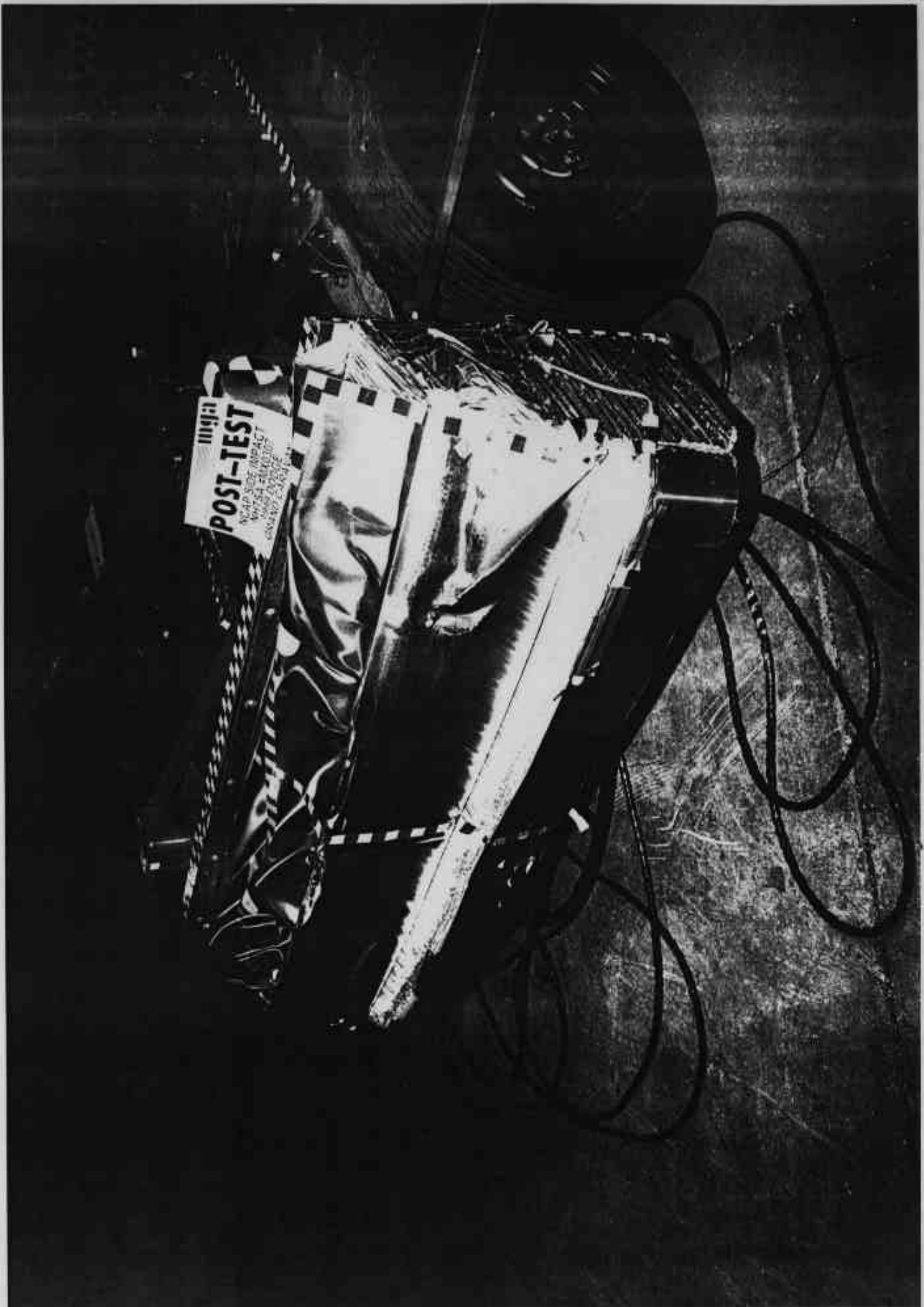


Photo No. A-20 - Post-Test MDB Left Side View



Photo No. A-21 - Pre-Test Driver Dummy Right Side View



Photo No. A-22 - Post-Test Driver Dummy Right Side View

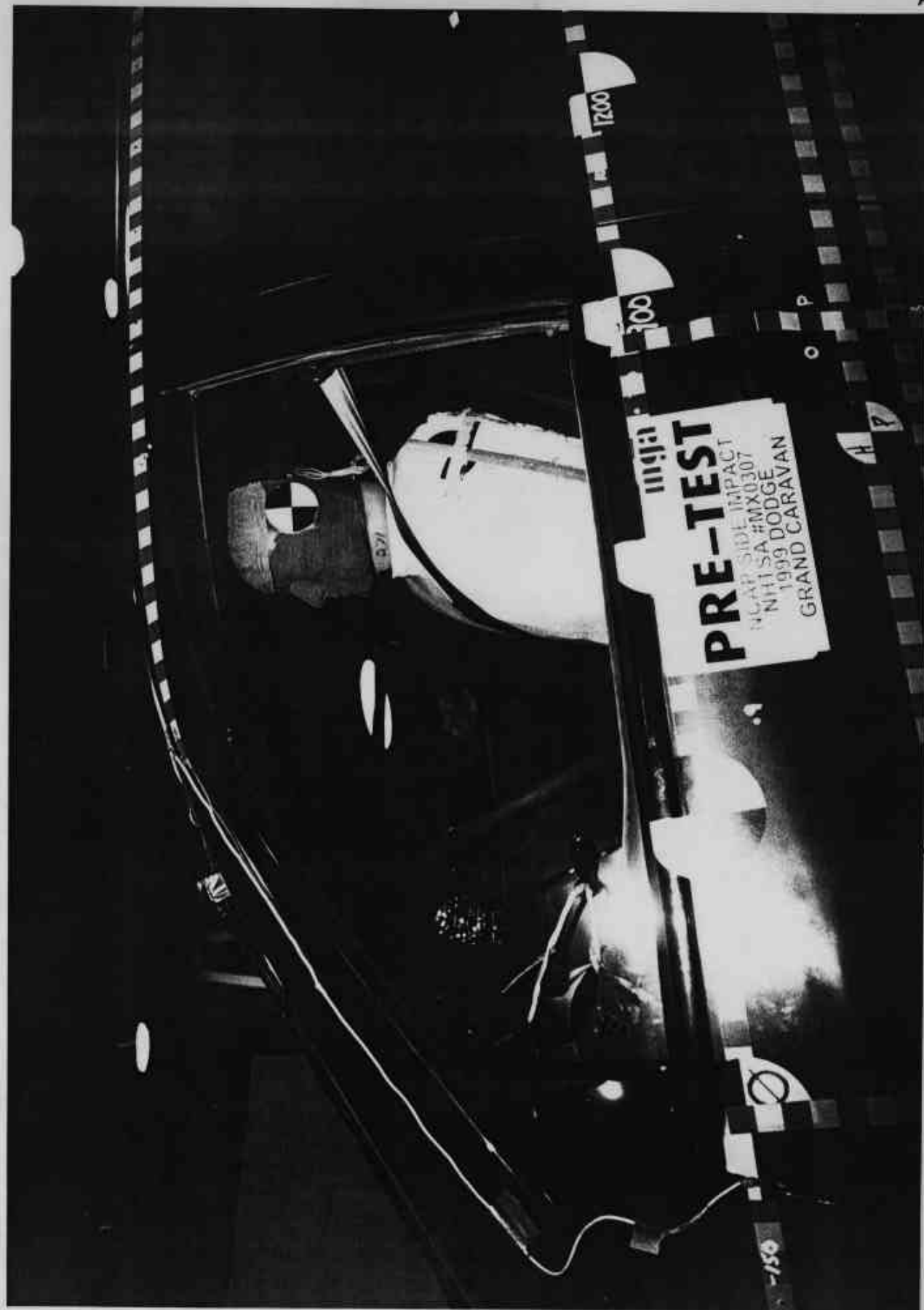


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

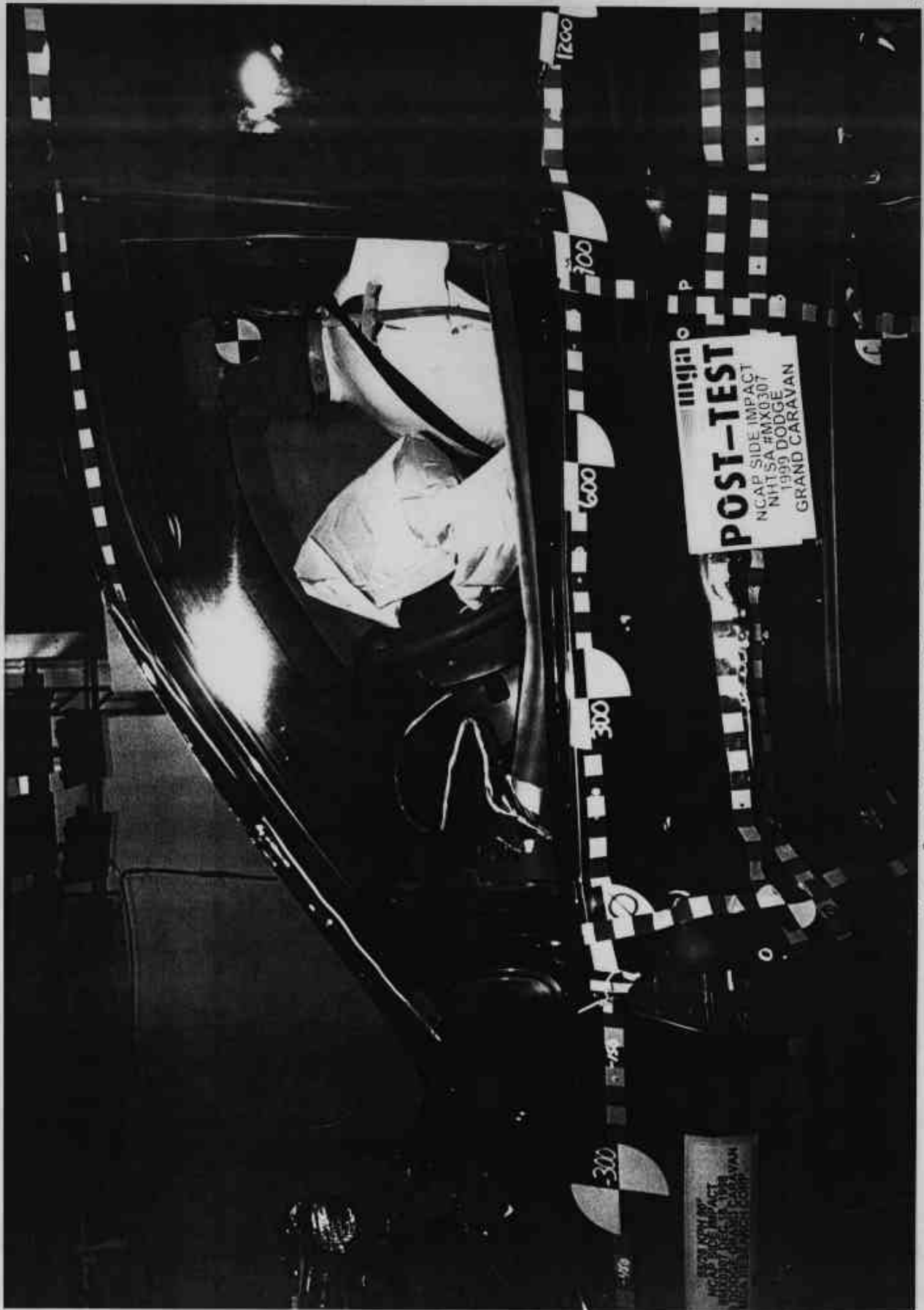


Photo No. A-24 - Post-Test Driver Dummy Left Side View

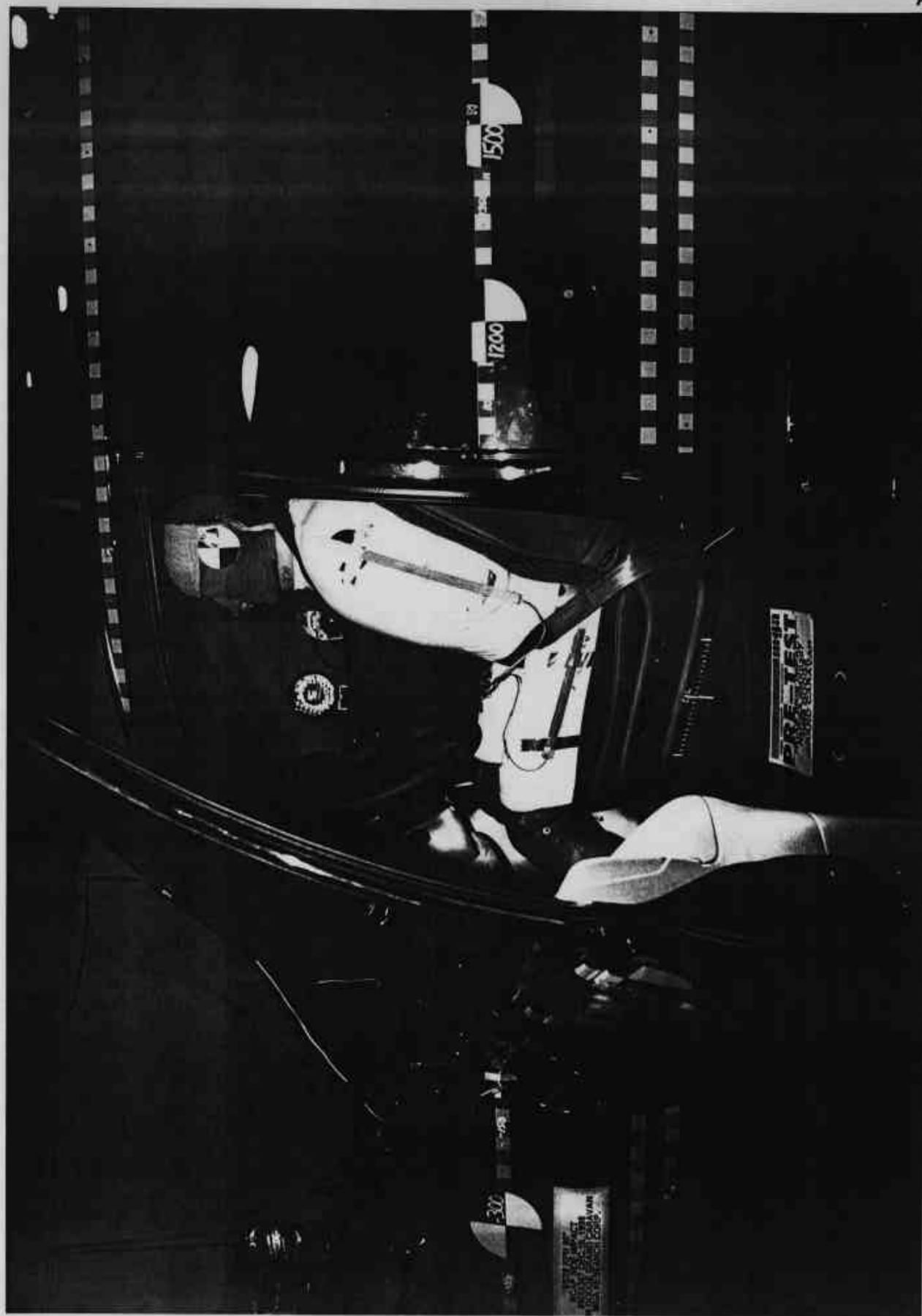


Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)



Photo No. A-26 - Pre-Test Driver Dummy Shoulder and Door Top View

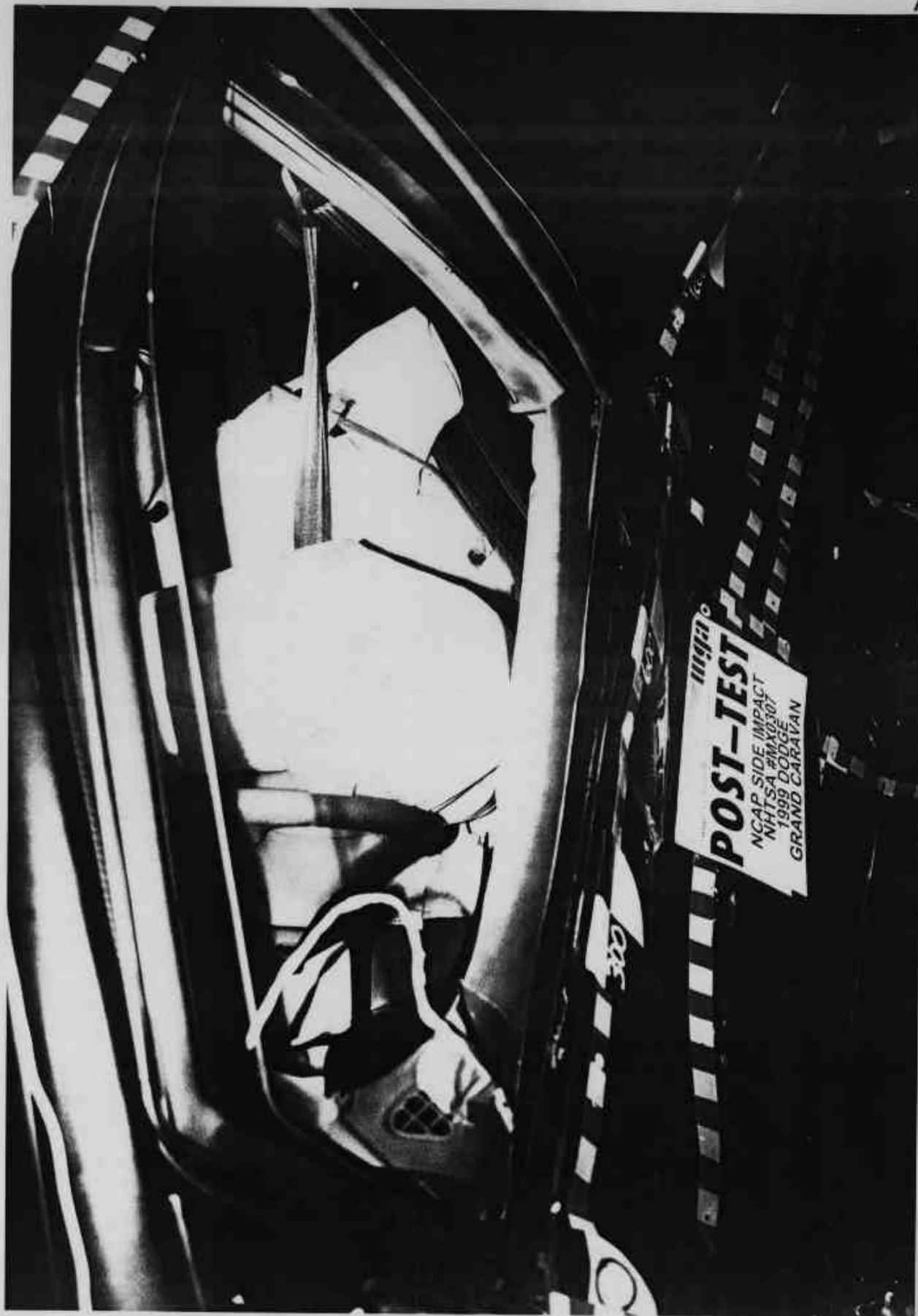


Photo No. A-27 - Post-Test Driver Dummy Shoulder and Door Top View



Photo No. A-28 - Post-Test Driver Dummy Contact



Photo No. A-29 - Post-Test Driver Dummy Contact



Photo No. A-30 - Pre-Test Passenger Dummy Right Side View



Photo No. A-31 - Post-Test Passenger Dummy Right Side View

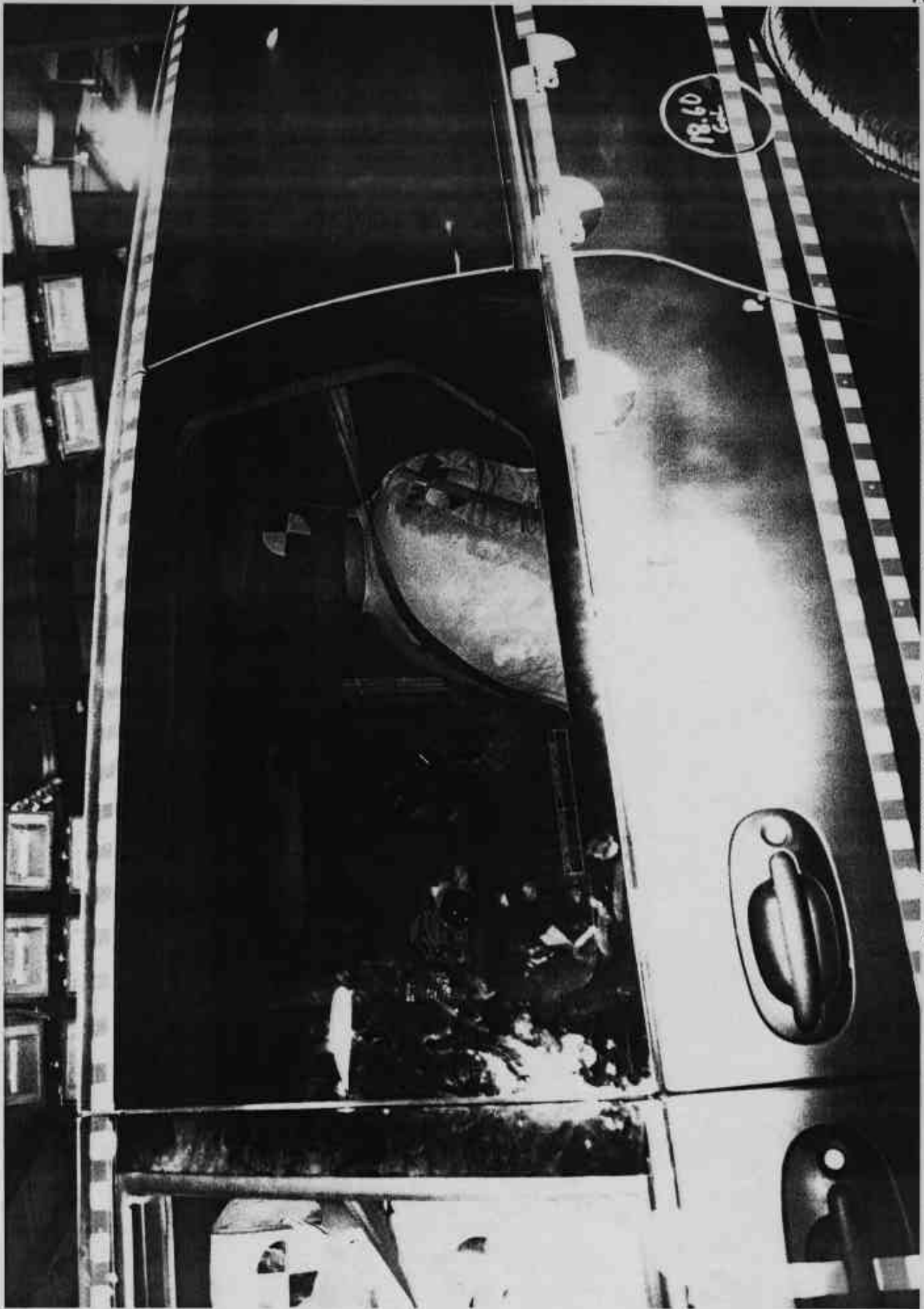


Photo No. A-32 - Pre-Test Passenger Dummy Left Side View

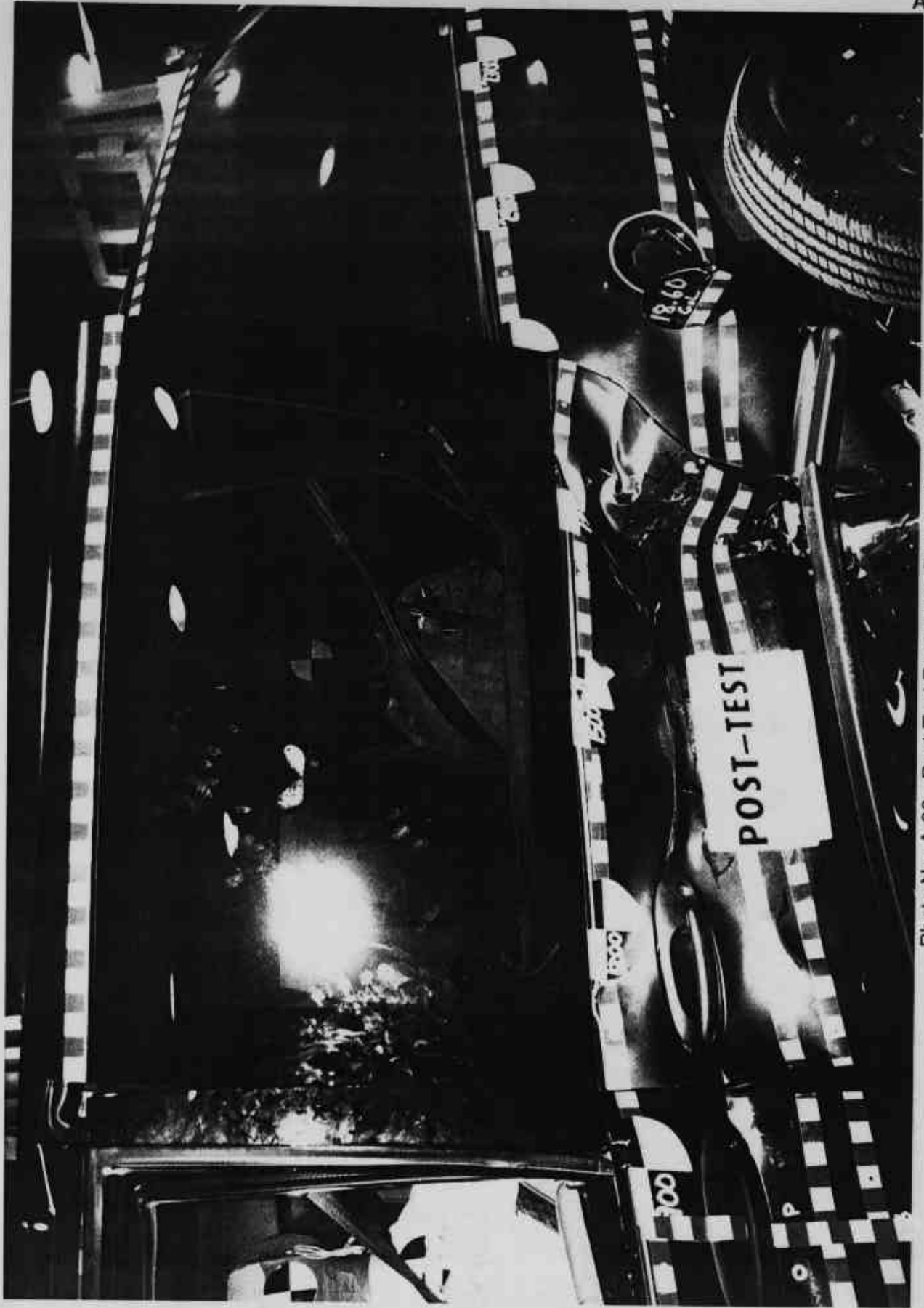


Photo No.-A-33 - Post-Test Passenger Dummy Left Side View

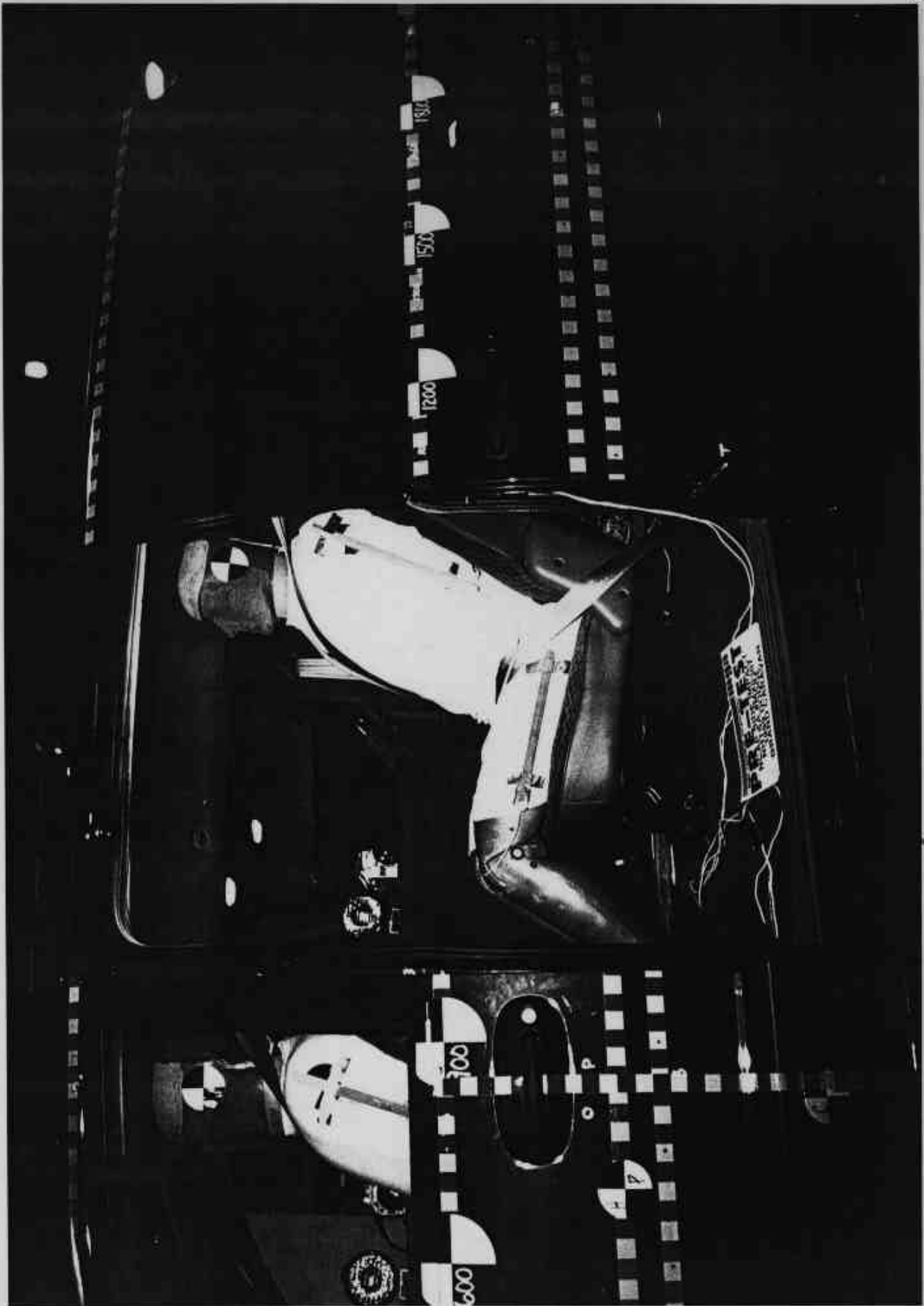


Photo No. A-34 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-35 - Pre-Test Passenger Dummy Shoulder and Door Top View

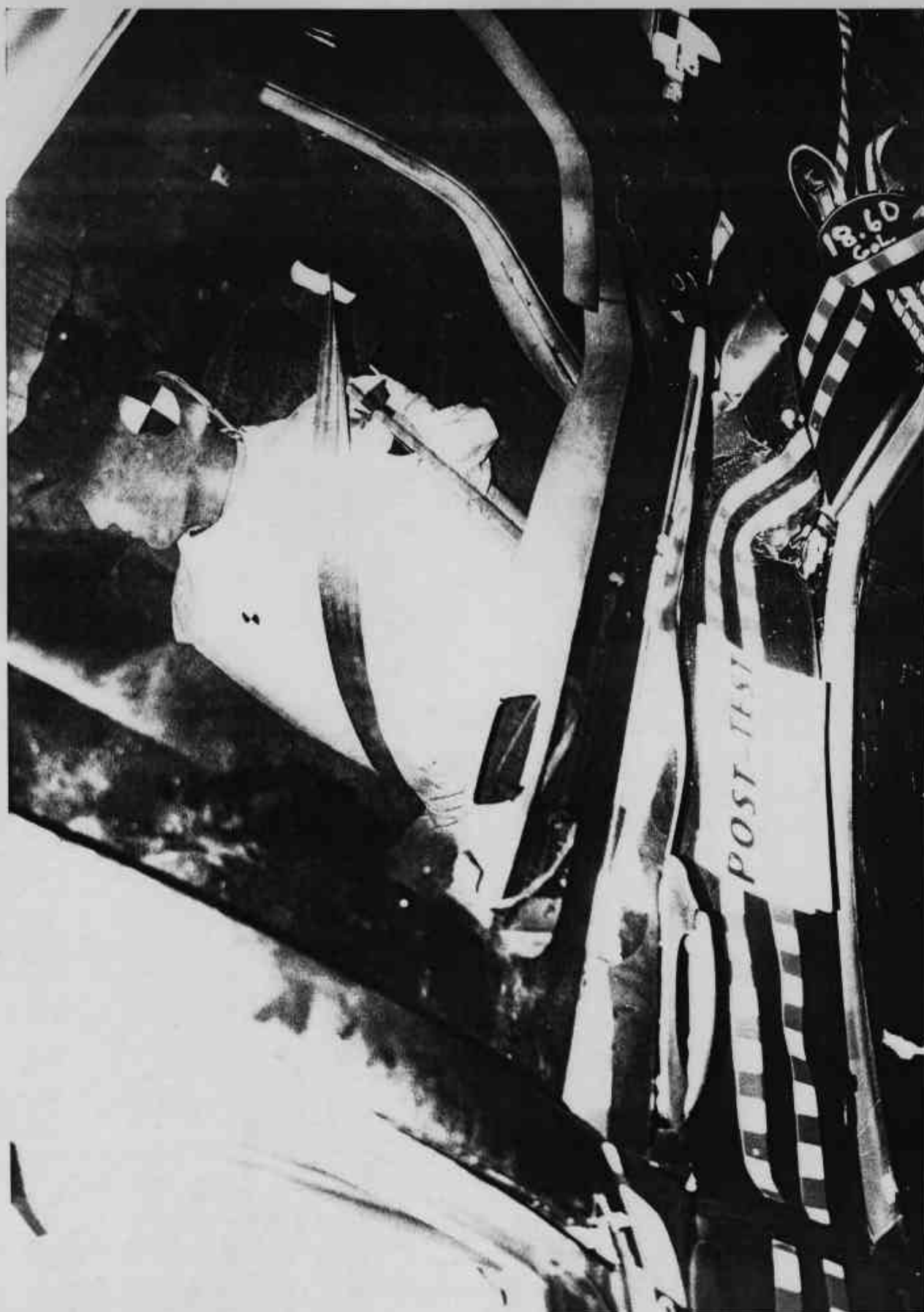


Photo No. A-36 - Post-Test Passenger Dummy Shoulder and Door Top View

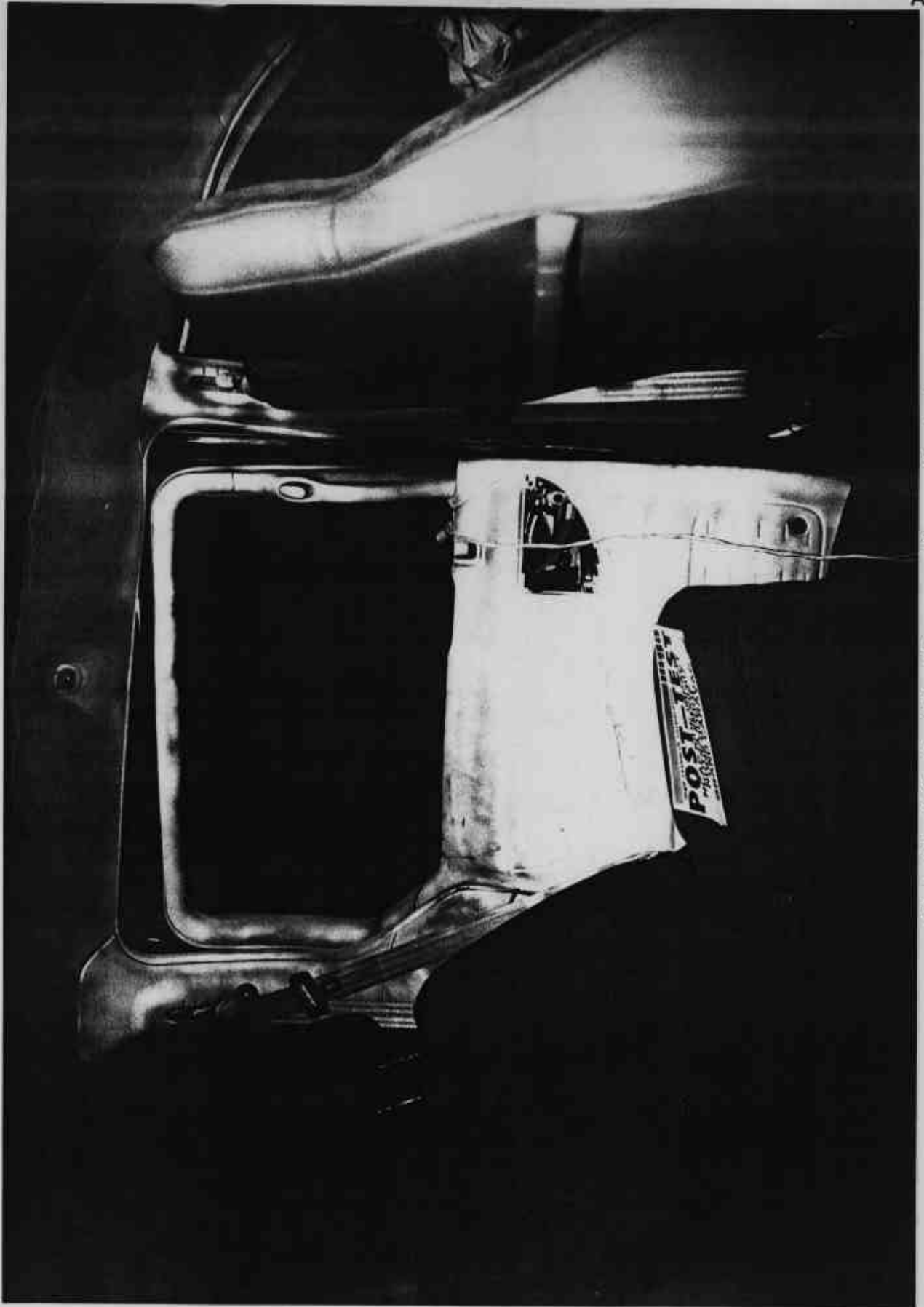


Photo No. A-37 - Post-Test Passenger Dummy Contact



Photo No. A-38 - Post-Test Passenger Dummy Head Contact



Photo No. A-39 - Post-Test Passenger Dummy Head Contact

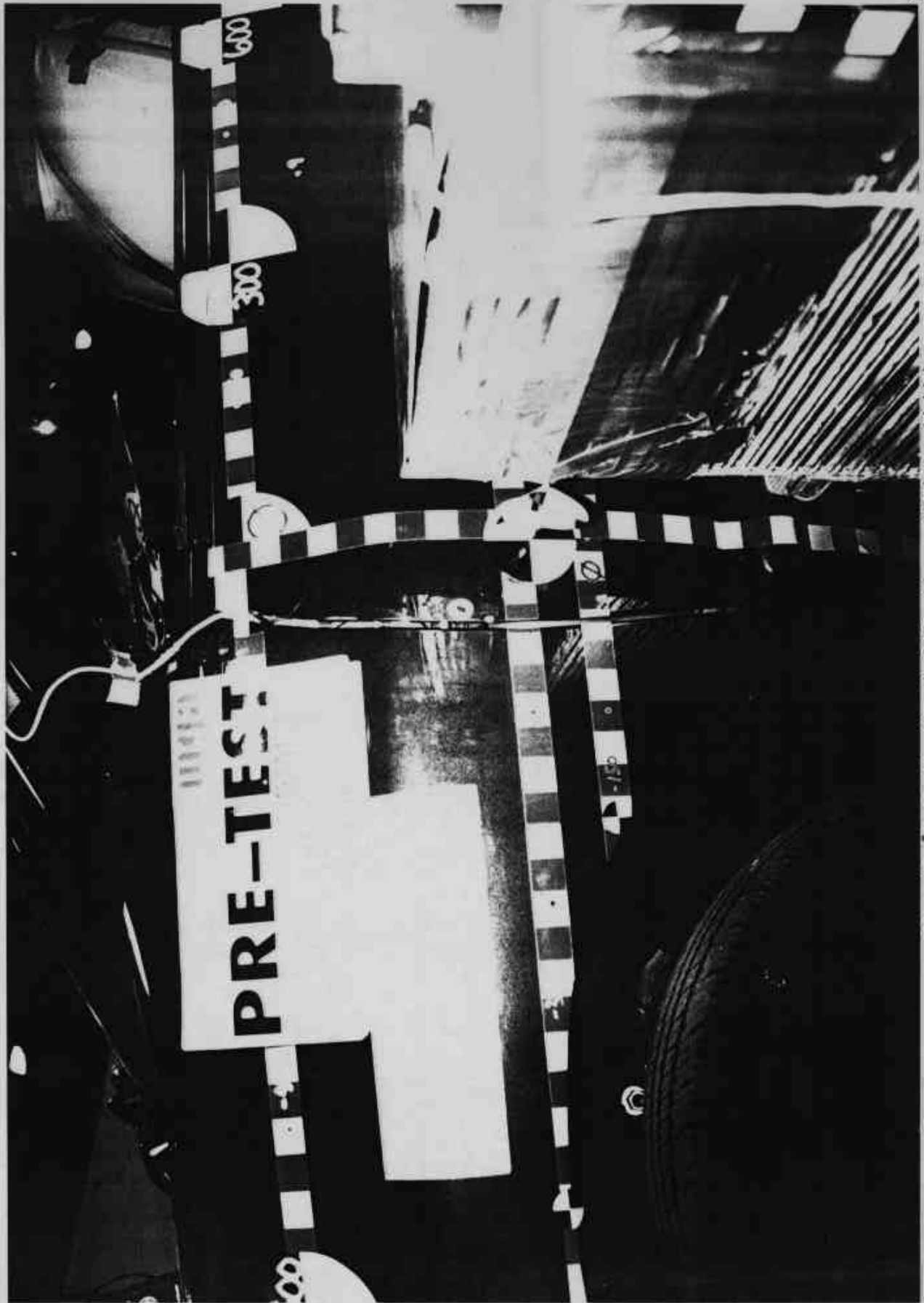


Photo No. A-40 - Pre-Test Left Front Impact Point on Vehicle



Photo No. A-41 - Post-Test Left Front Impact Point on Vehicle

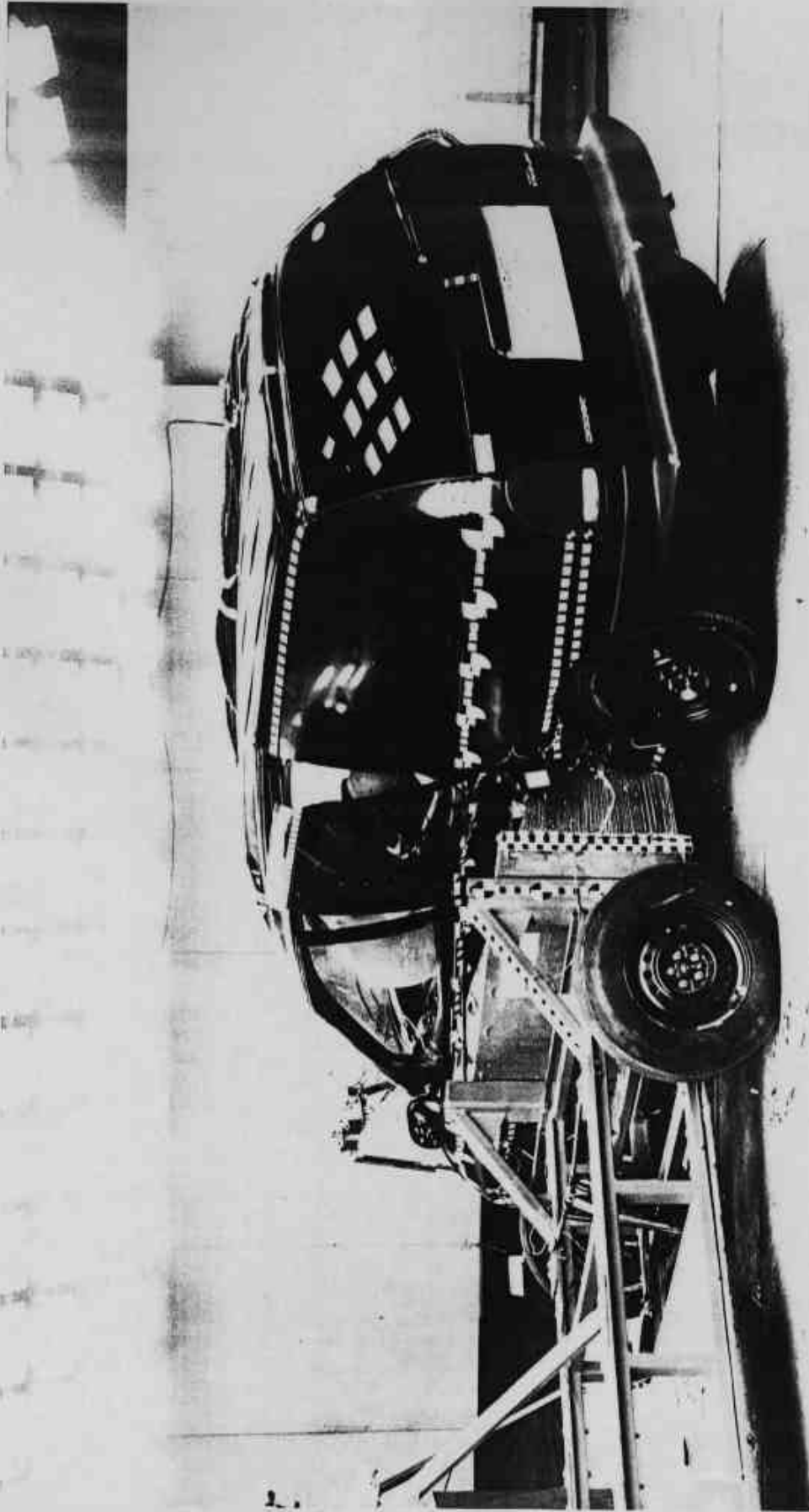


Photo No. A-42 - Impact

MFD BY CHRYSLER CORPORATION		DATE OF MFR 10-98	GVWR 2341 KG (5160 LB)
GVWR FRONT 1203 KG (2650 LB)	WITH TIRES P205/75R14	RIMS AT 14X6	COLD 241 KPA (35 PSI)
GVWR REAR 1225 KG (2700 LB)	WITH TIRES P205/75R14	RIMS AT 14X6	COLD 241 KPA (35 PSI)

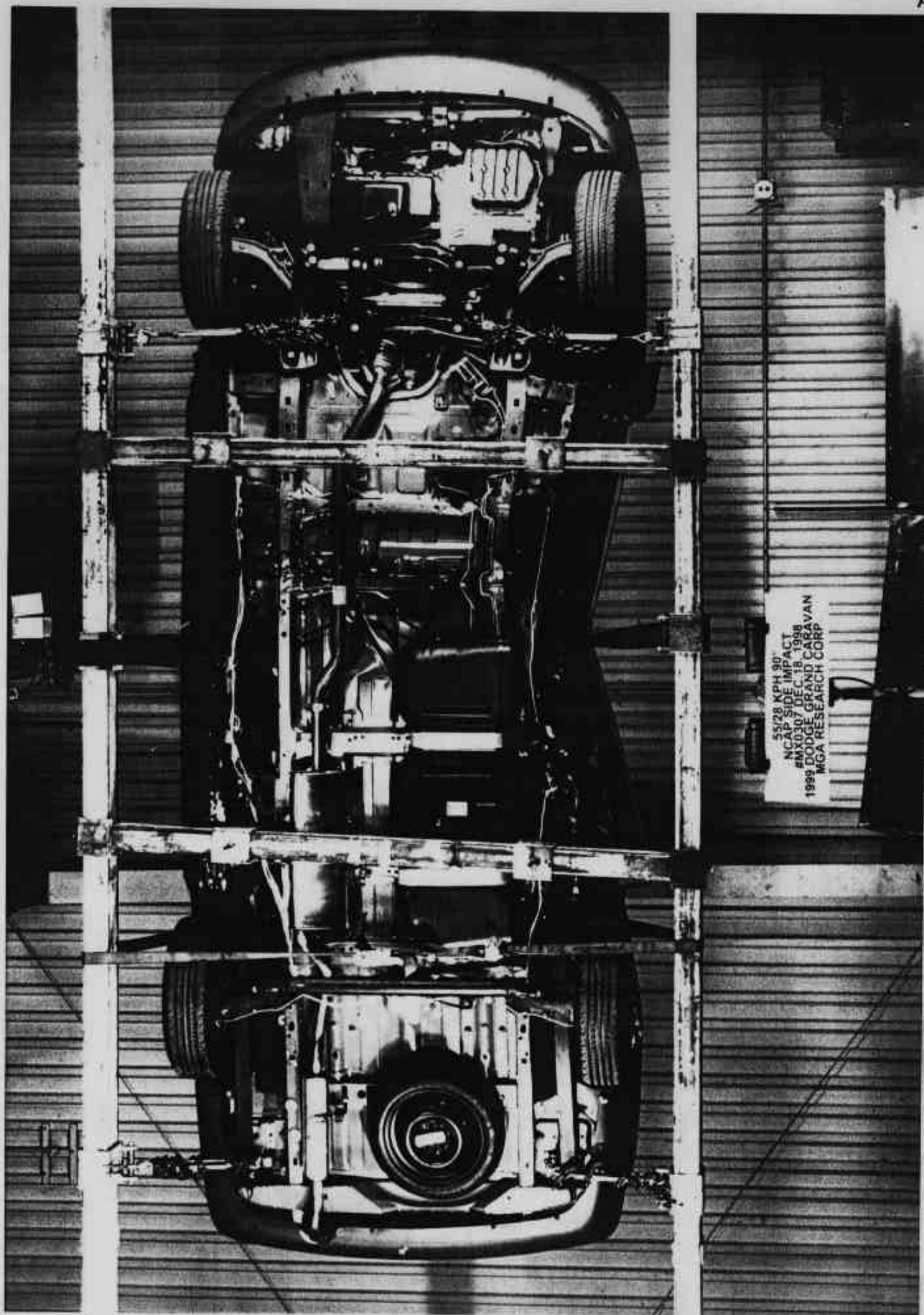
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 2B4GP24GXR186889 TYPE: MPV SINGLE X DUAL



MDM: 100900 914AA DMT:068 VEHICLE MADE IN CANADA Tm:FS:J 46485e5

Photo No. A-43 - Vehicle Certification Label and Tire Placard



55/28 MPH 90°
NCAP SIDE IMPACT
#MX0307 DEC 18, 1998
1999 DODGE GRAND CARAVAN
MGA RESEARCH CORP

Photo No. A-44 - Rollover 90°

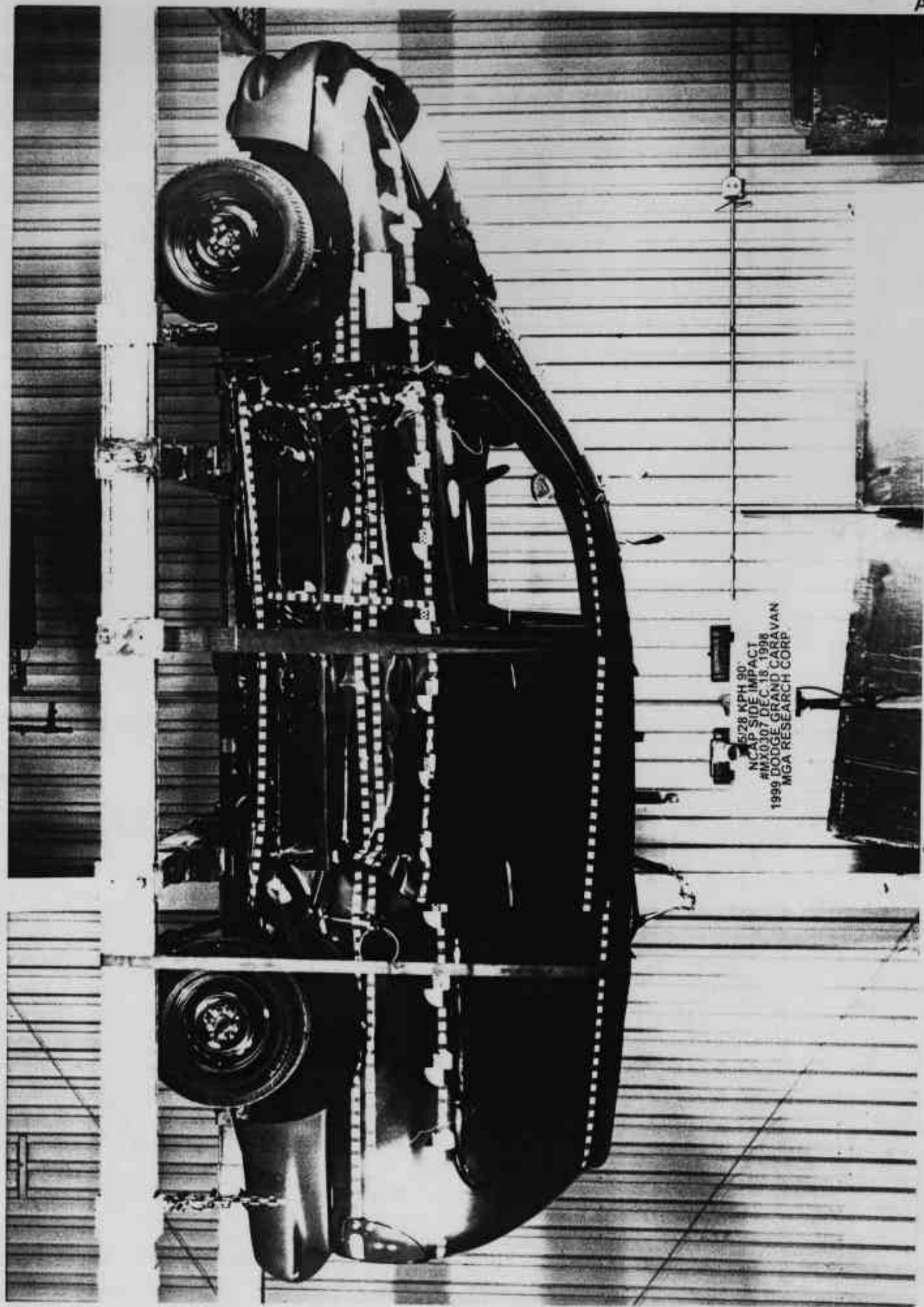


Photo No. A-45 - Rollover 180°

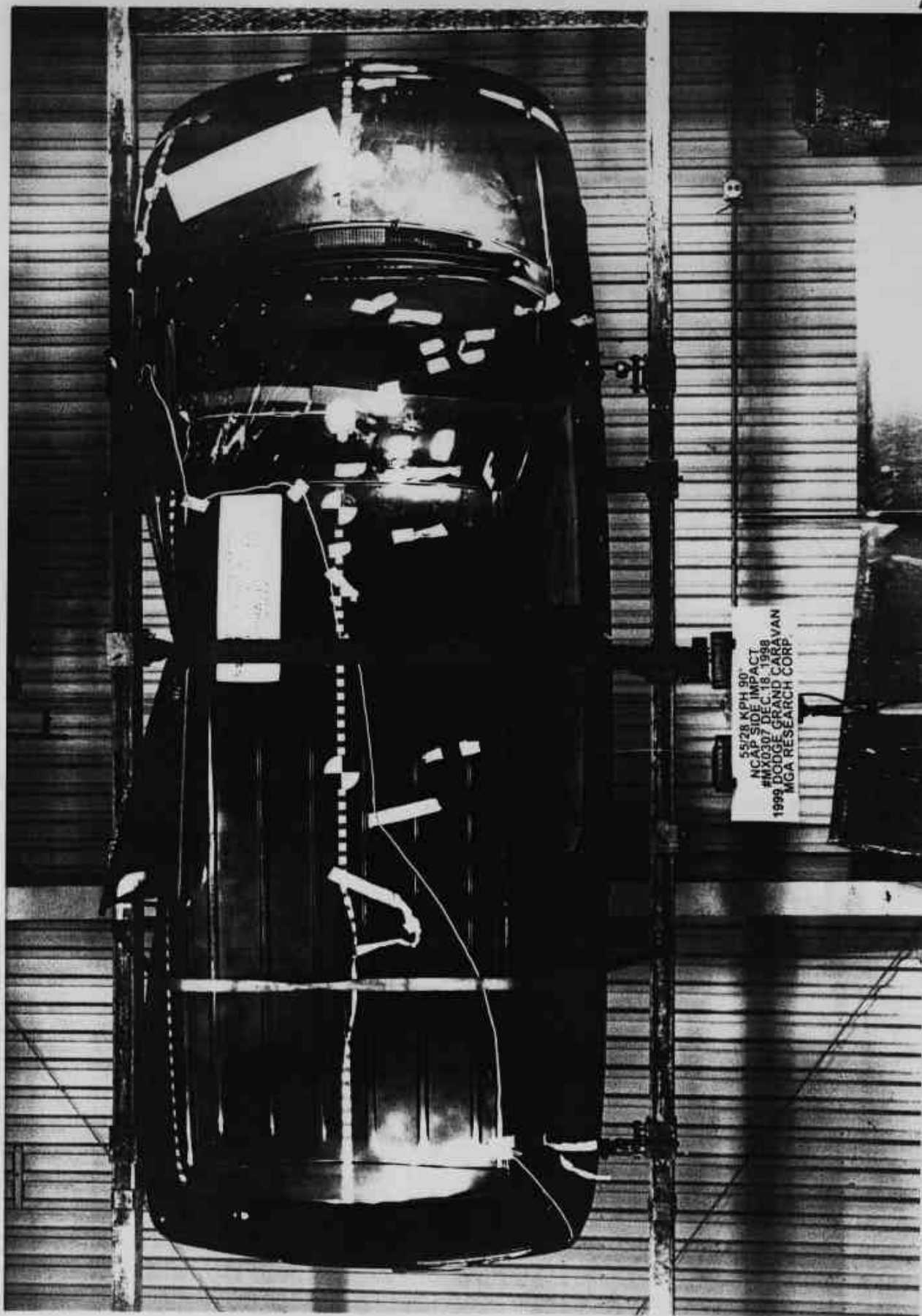


Photo No. A-46 - Rollover 270°

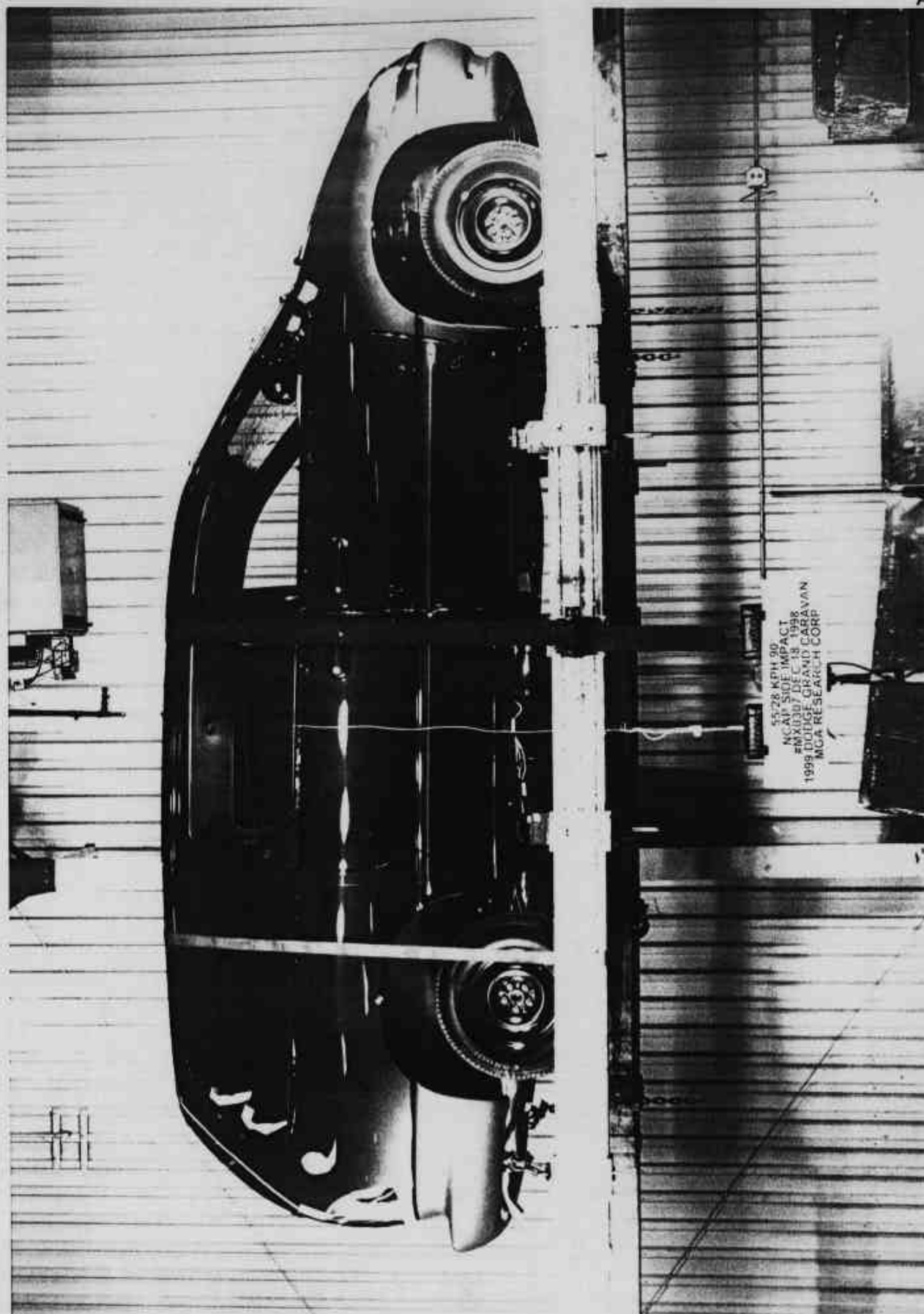


Photo No. A-47 - Rollover 360°

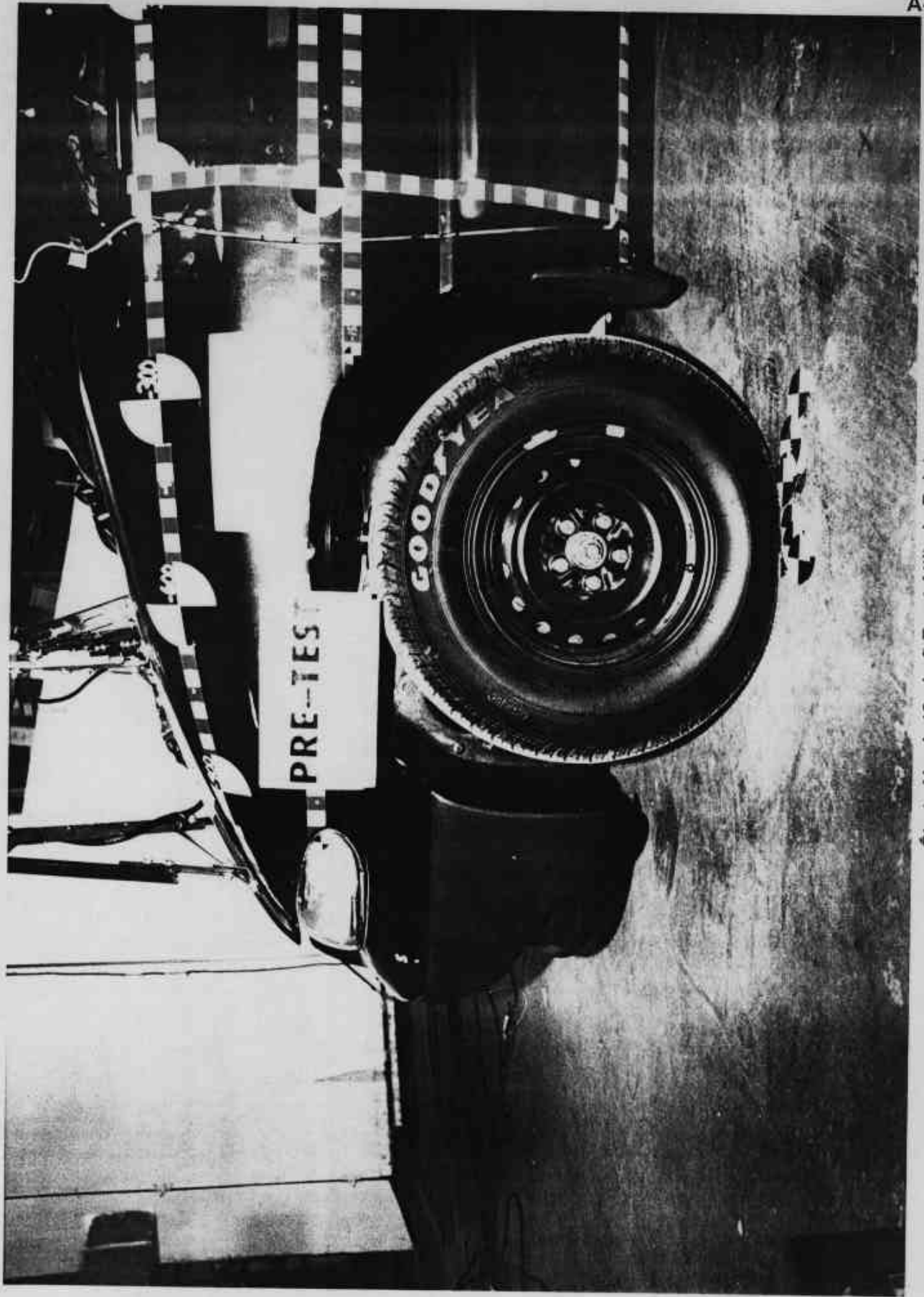


Photo No. A-48 - Left Front Attitude Point

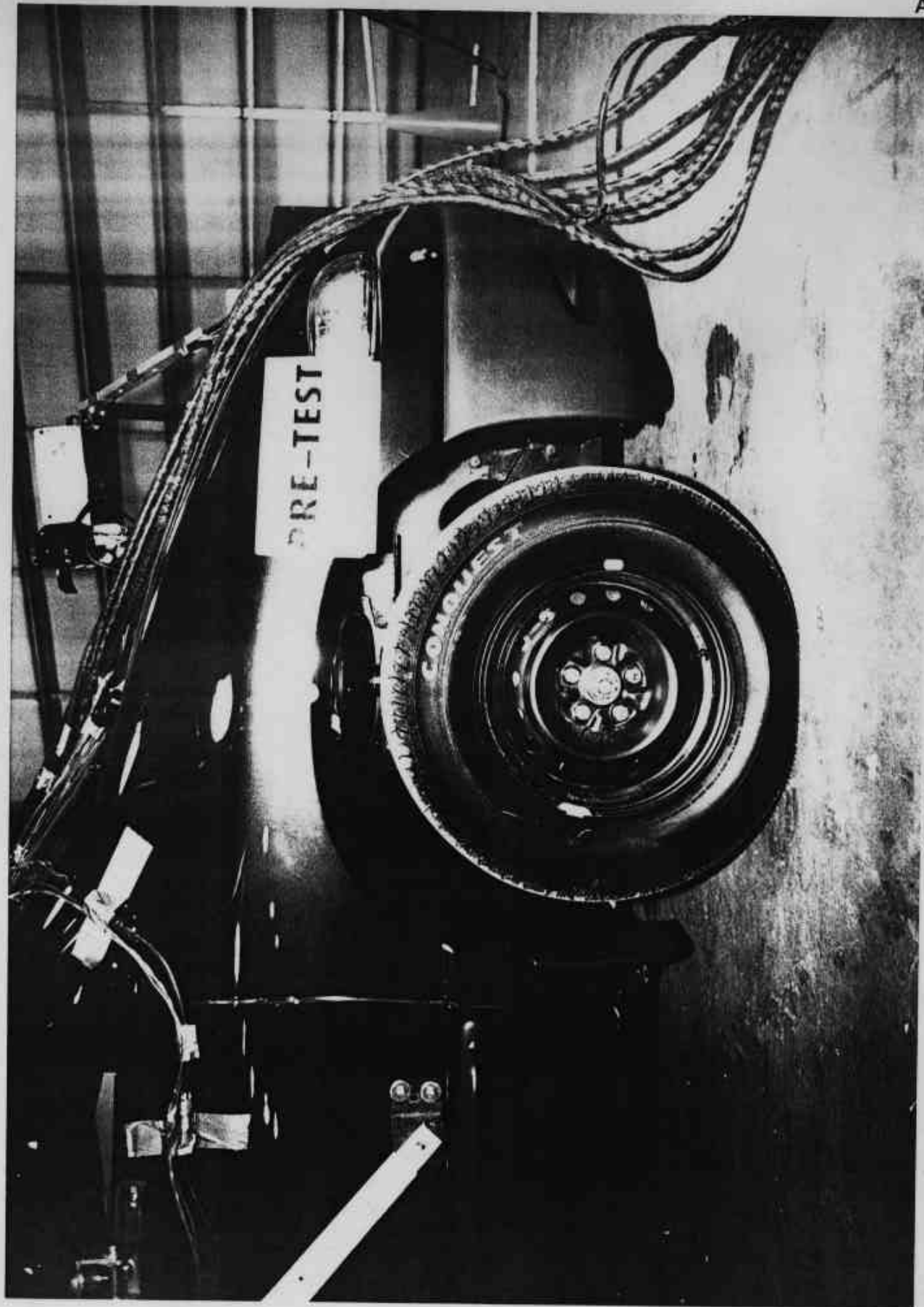


Photo No. A-49 - Right Front Attitude Point

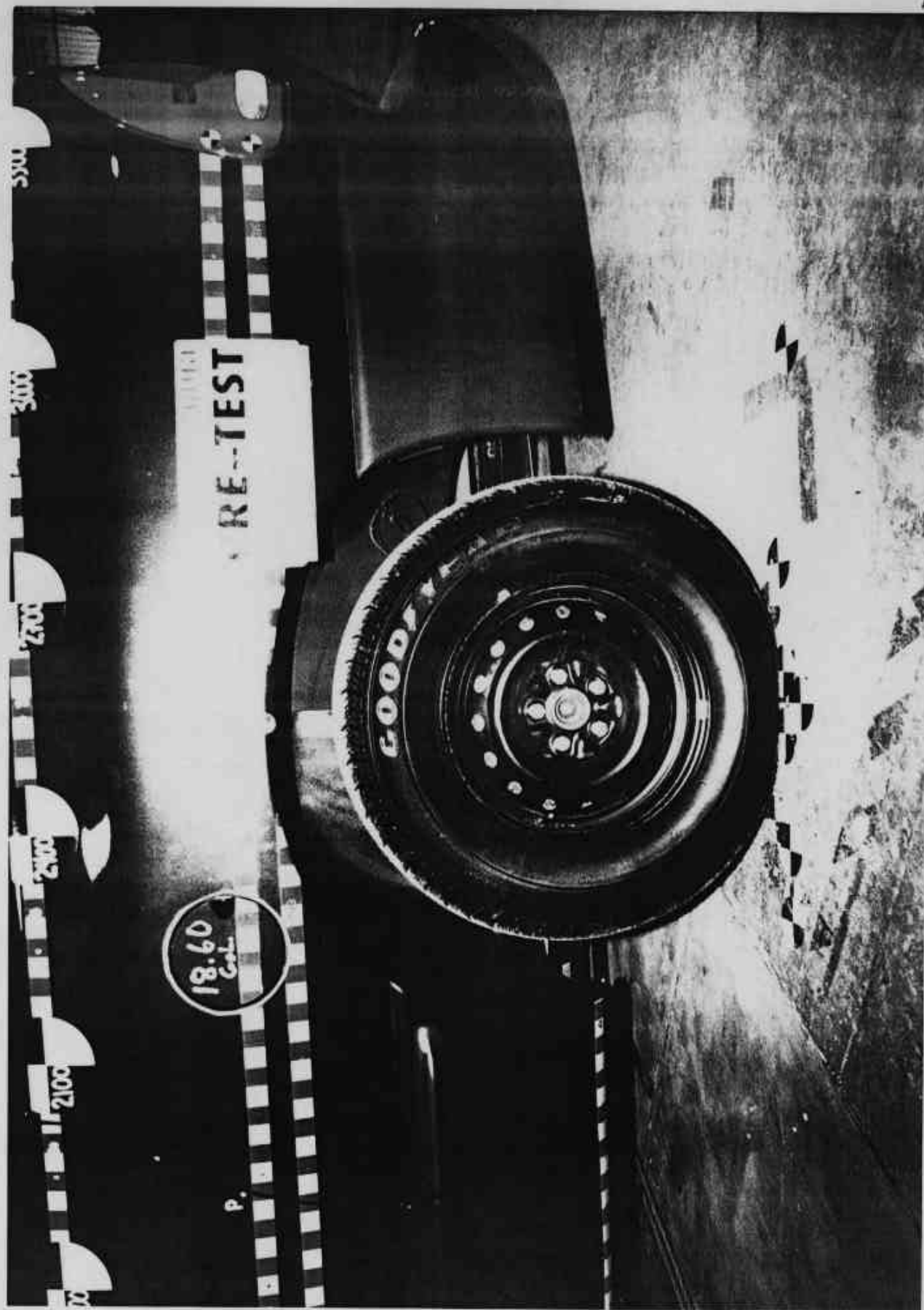


Photo No. A-50 - Left Rear Attitude Point



Photo No. A-51 - Right Rear Attitude Point

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* Data not valid after approximately 63 msec.

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TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

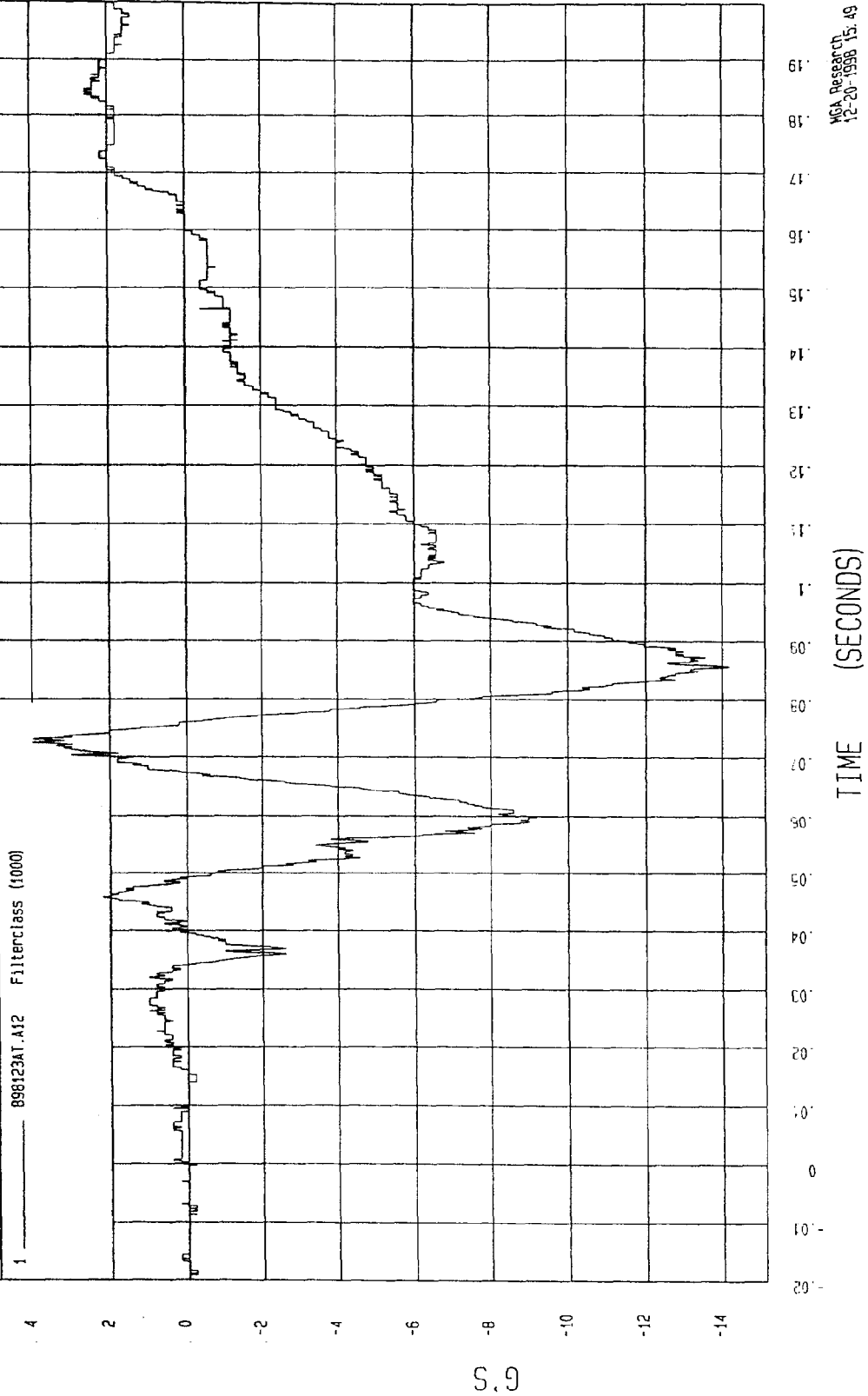
SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 3.99 G'S at 72 msec

Minimum = -14.17 G'S at 86 msec

DRIVER HEAD X ACCELERATION



TEST DATE: 12-18-1998

TEST: HIGH SPEED LATERAL IMPACT

Speed: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = .47 KPH at 49 msec

Minimum = -16.17 KPH at 160 msec

DRIVER HEAD X VELOCITY

1 — 890123A1.V12 Filterclass (100)



TIME Seconds

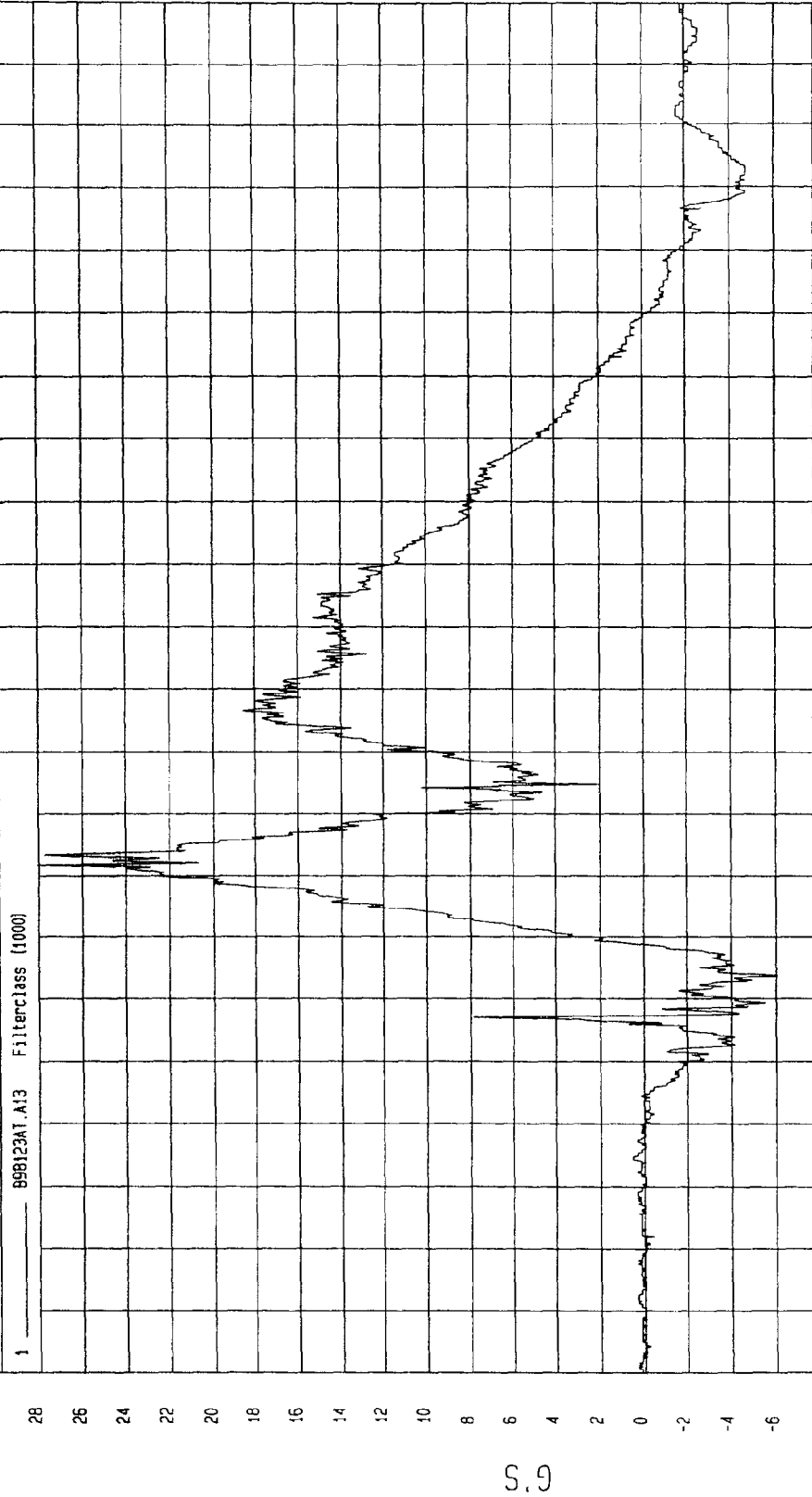
MCA Research
12-20-1998 15:49

TEST: HIGH SPEED LATERAL IMPACT . TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.07 G'S at 44 msec Maximum = 28.08 G'S at 62 msec

DRIVER HEAD Y ACCELERATION



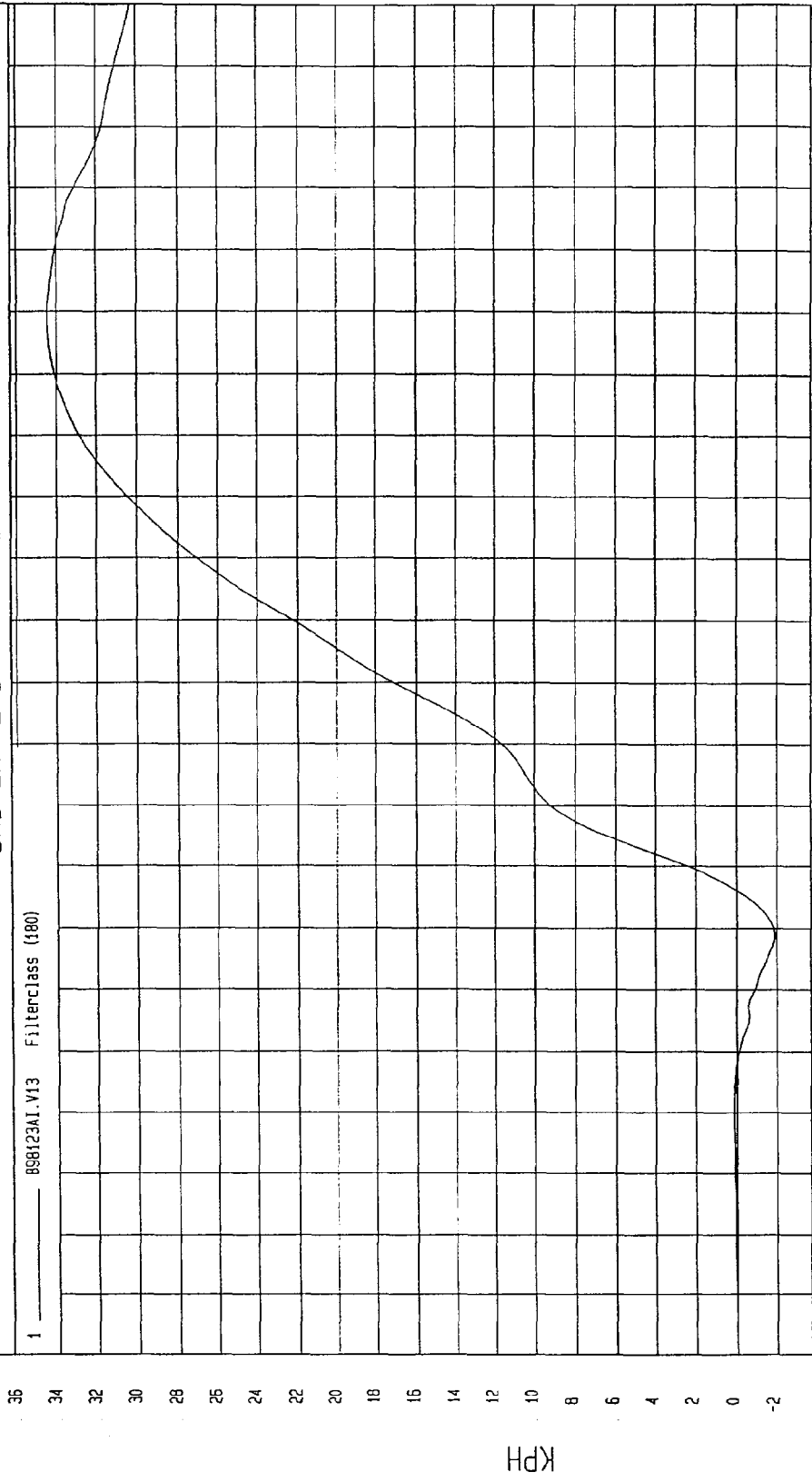
MOA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -1.9 KPH at 49 msec Maximum = 34.46 KPH at 149 msec

DRIVER HEAD Y VELOCITY



TIME Seconds

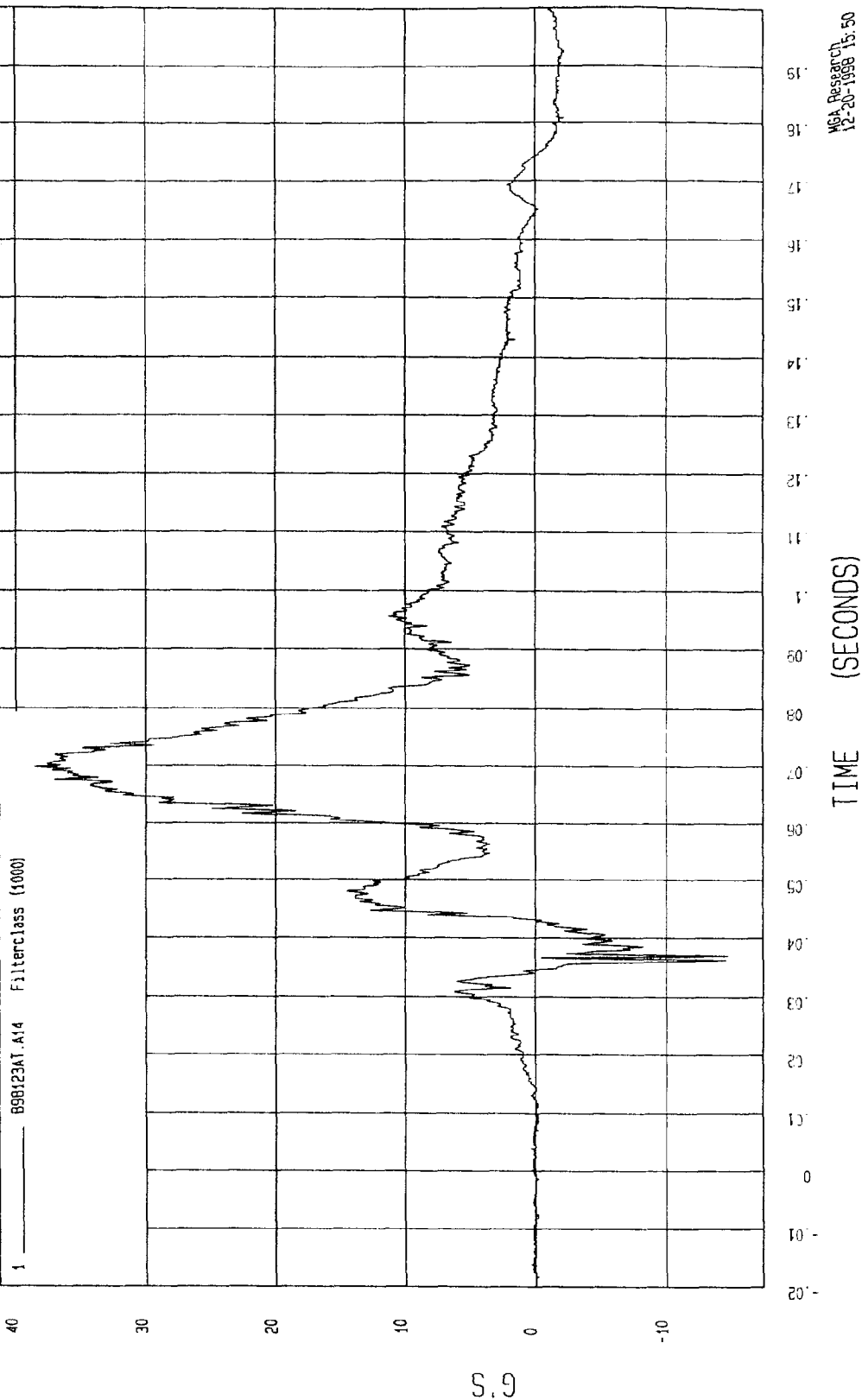
WGA Research
12-20-1998 15:49

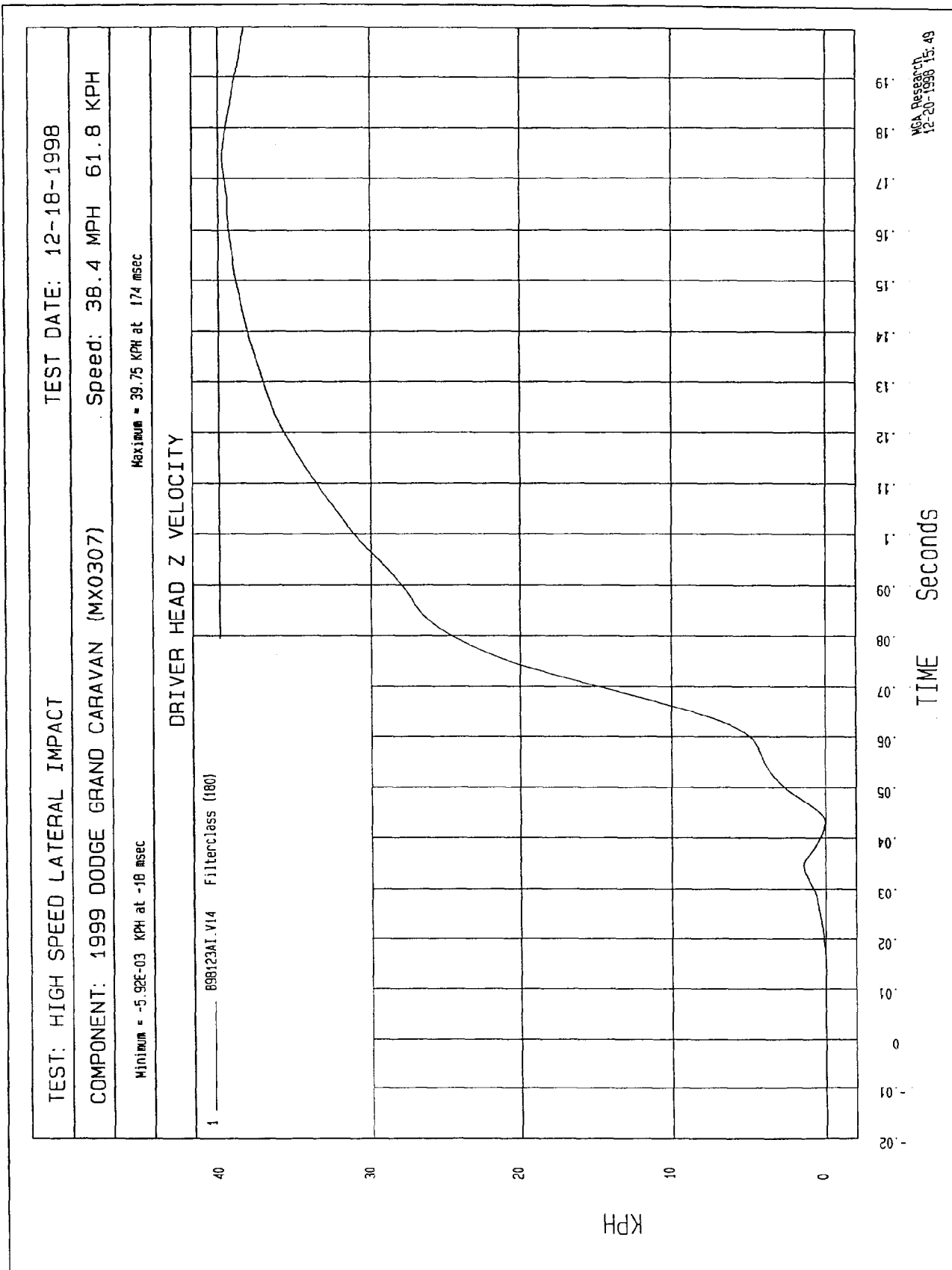
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -14.72 G'S at 37 msec Maximum = 38.6 G'S at 70 msec

DRIVER HEAD Z ACCELERATION





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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

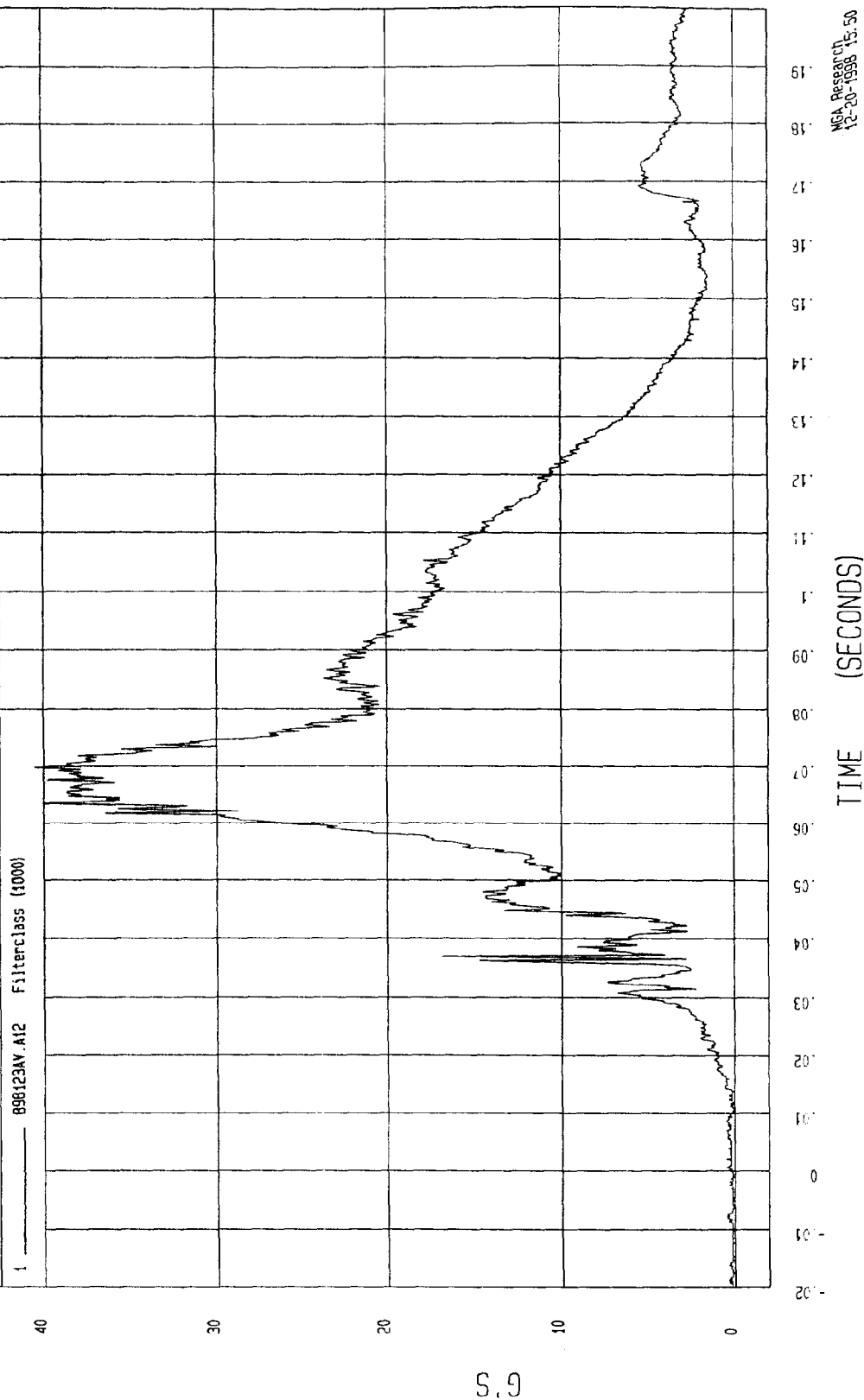
SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 40.51 G'S at 70 msec

Minimum = 9.01E-02 G'S at -17 msec

DRIVER HEAD RESULTANT

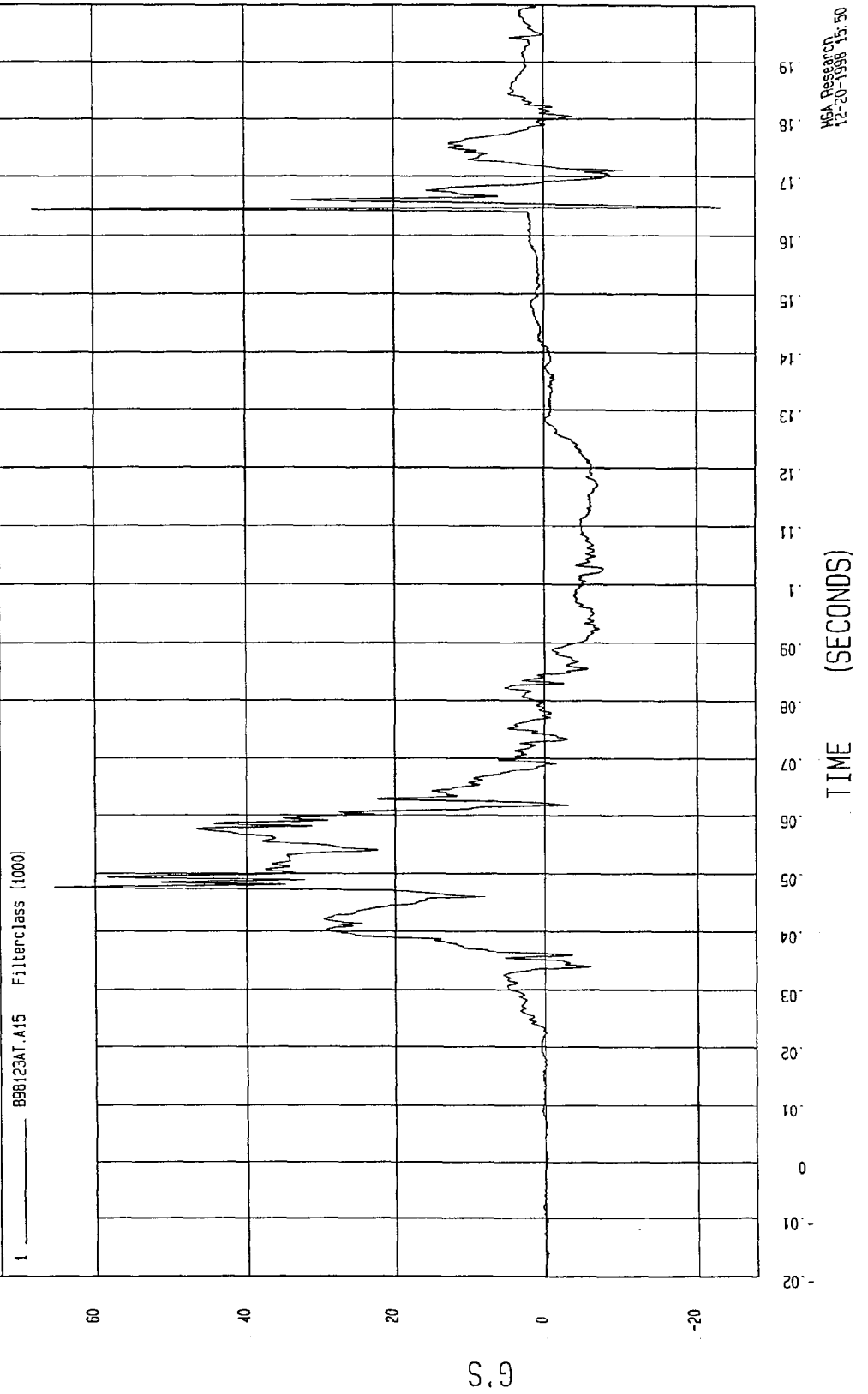


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -23.21 G'S at 165 msec Maximum = 67.95 G'S at 164 msec

DRIVER UPPER RIB Y ACCELERATION

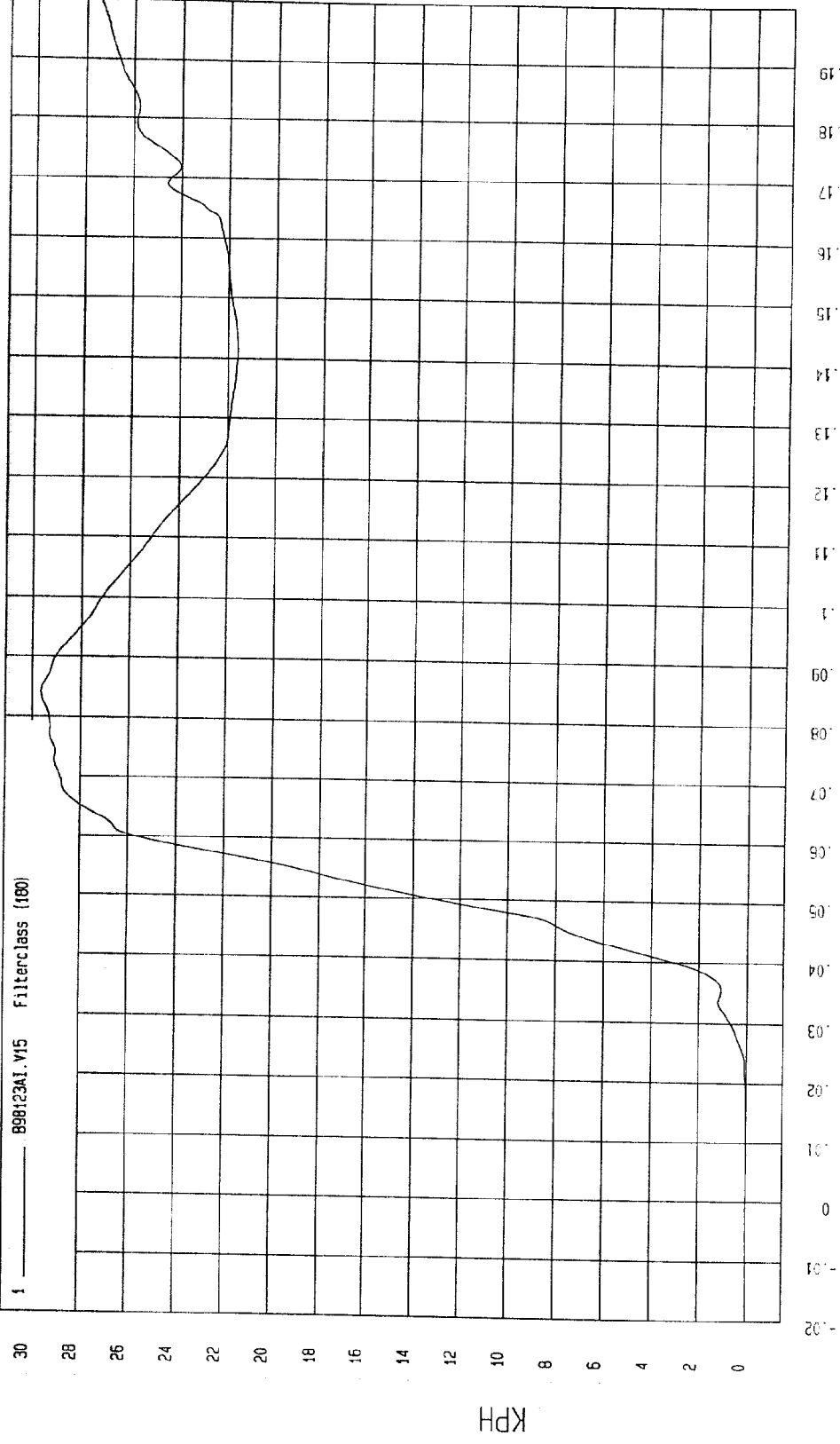


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

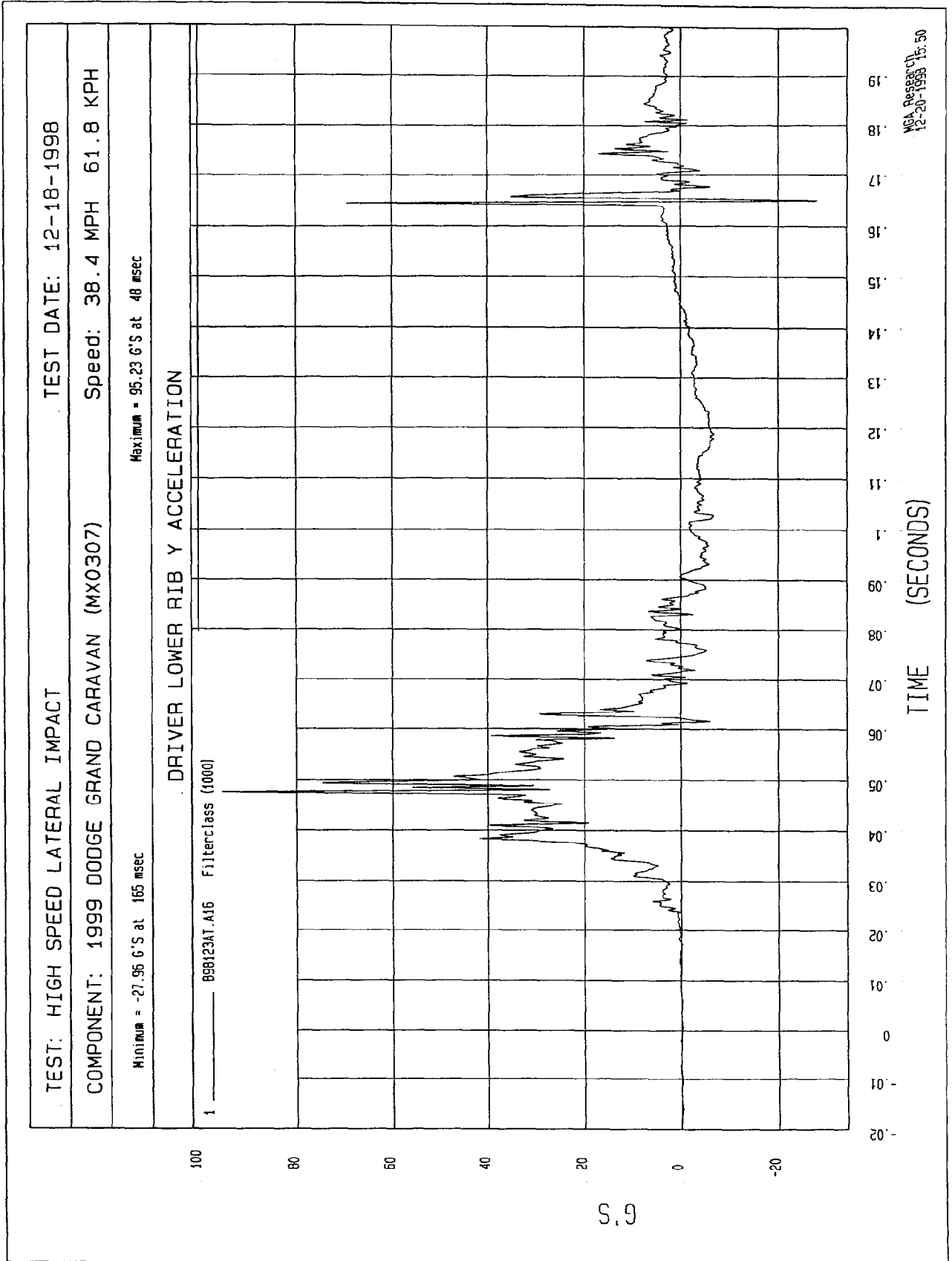
Minimum = -1.12E-02 KPH at 7 msec Maximum = 29.64 KPH at 84 msec

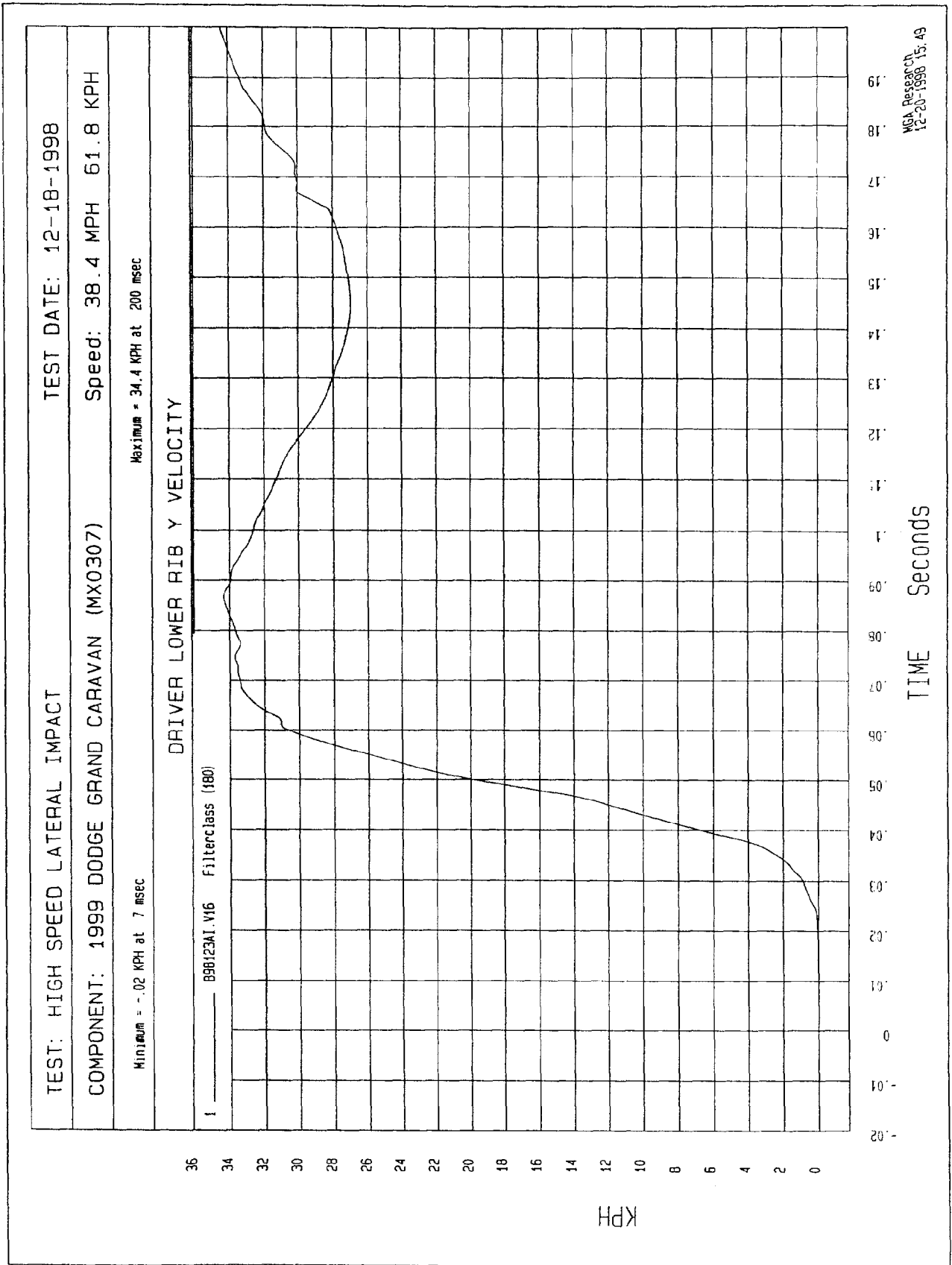
DRIVER UPPER RIB Y VELOCITY

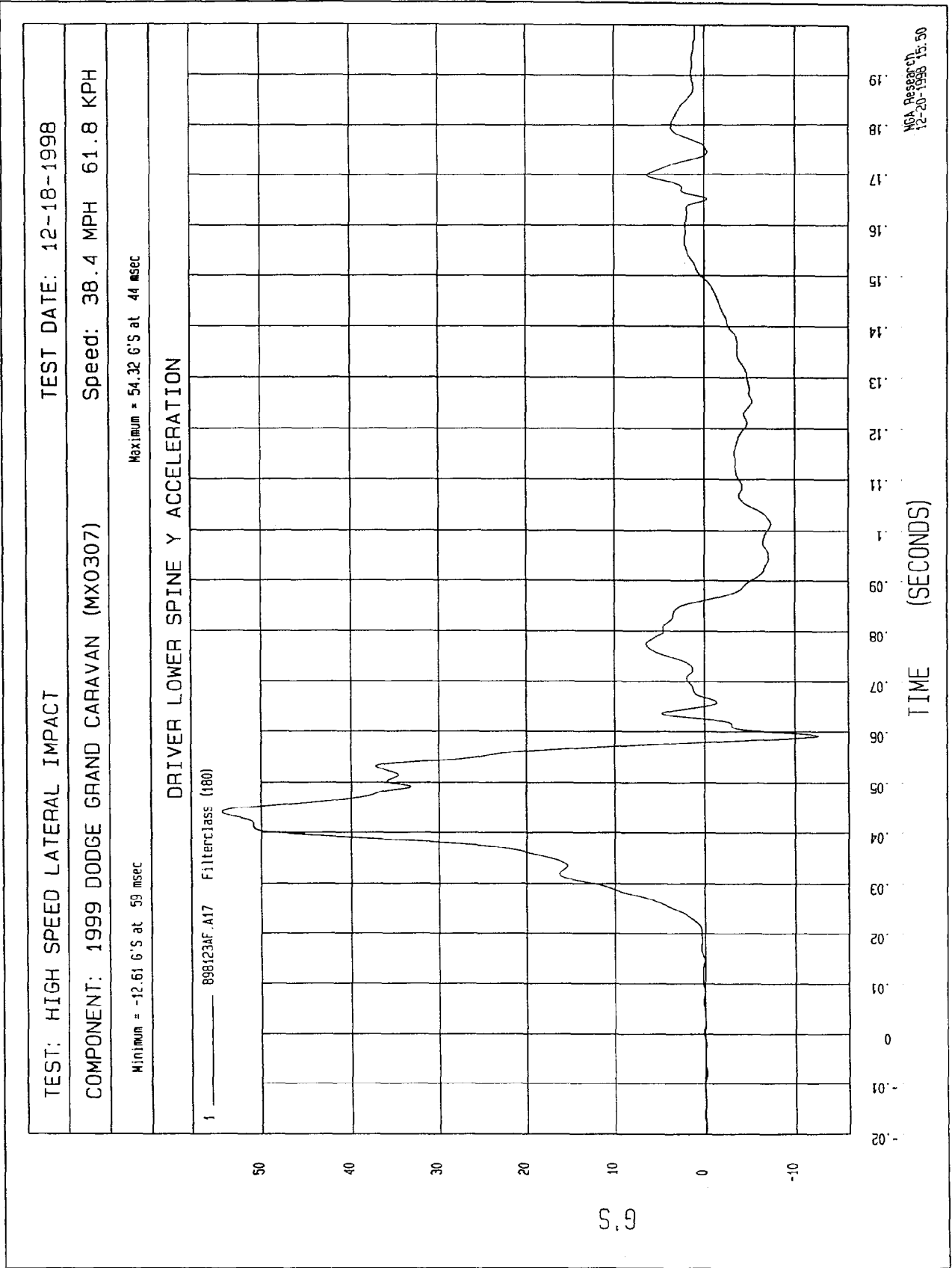


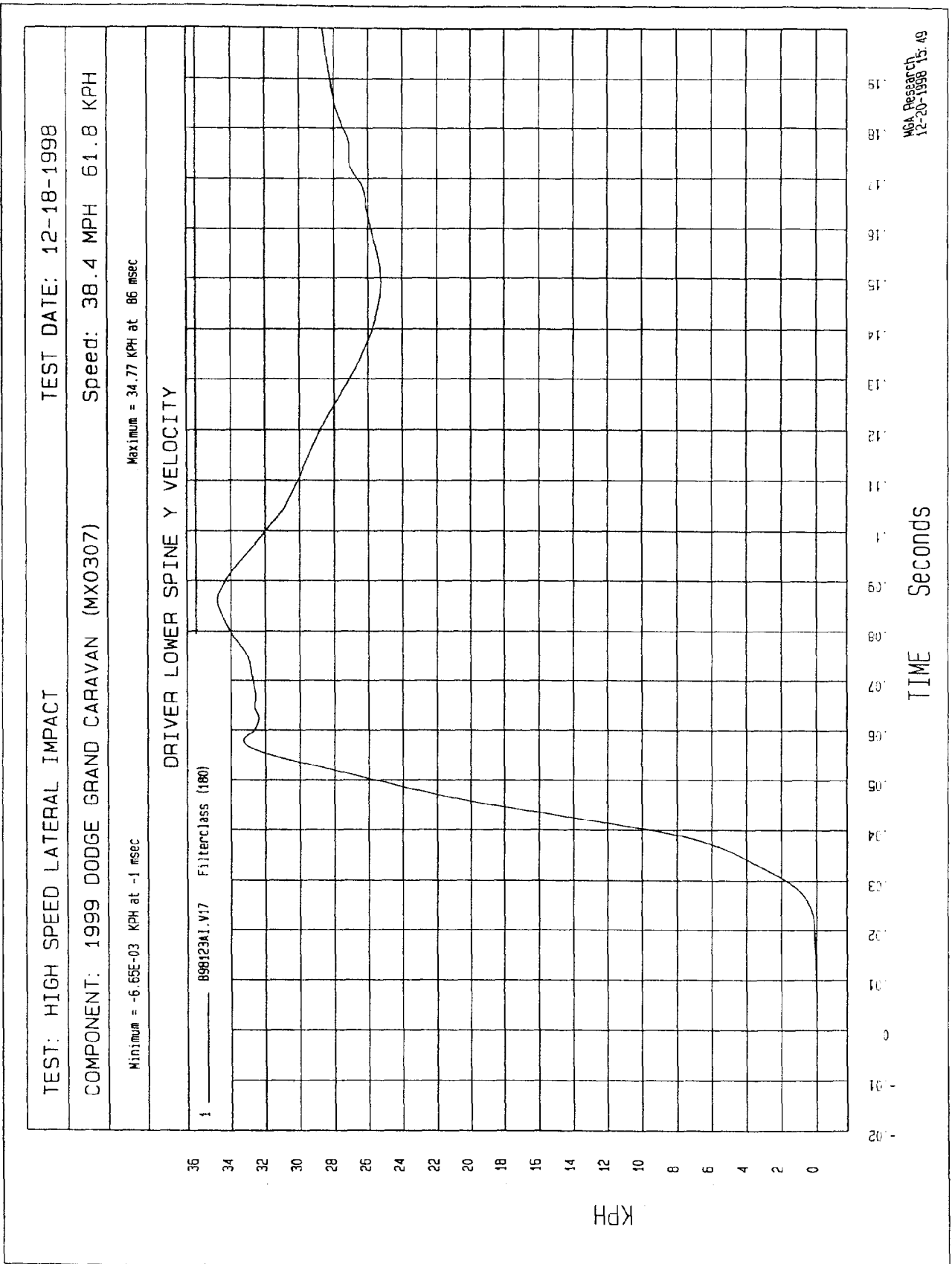
TIME Seconds

NSA Research
12-20-1998 15:49







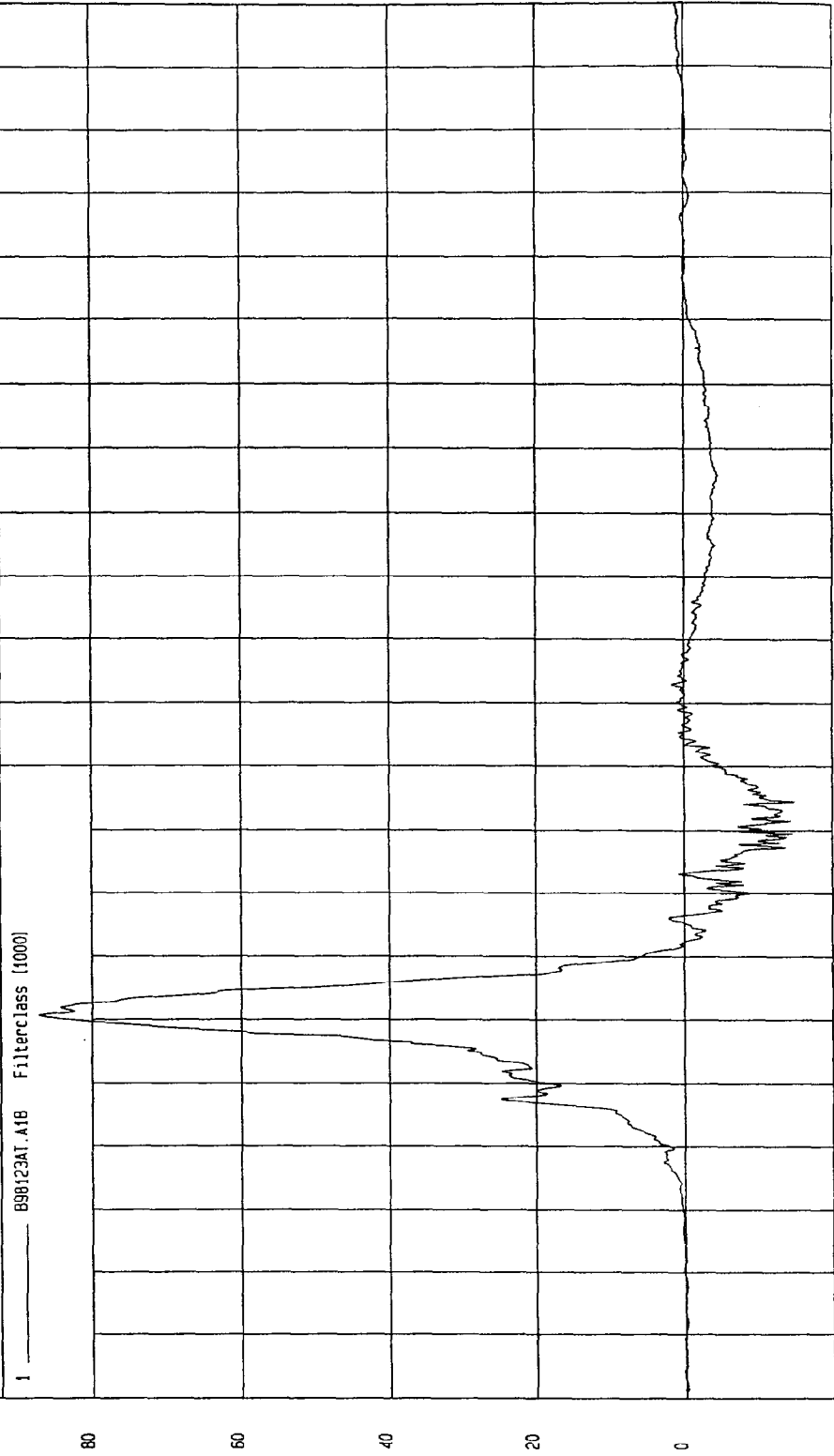


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -14.85 G'S at 74 msec Maximum = 86.93 G'S at 41 msec

DRIVER PELVIS Y ACCELERATION



TIME (SECONDS)

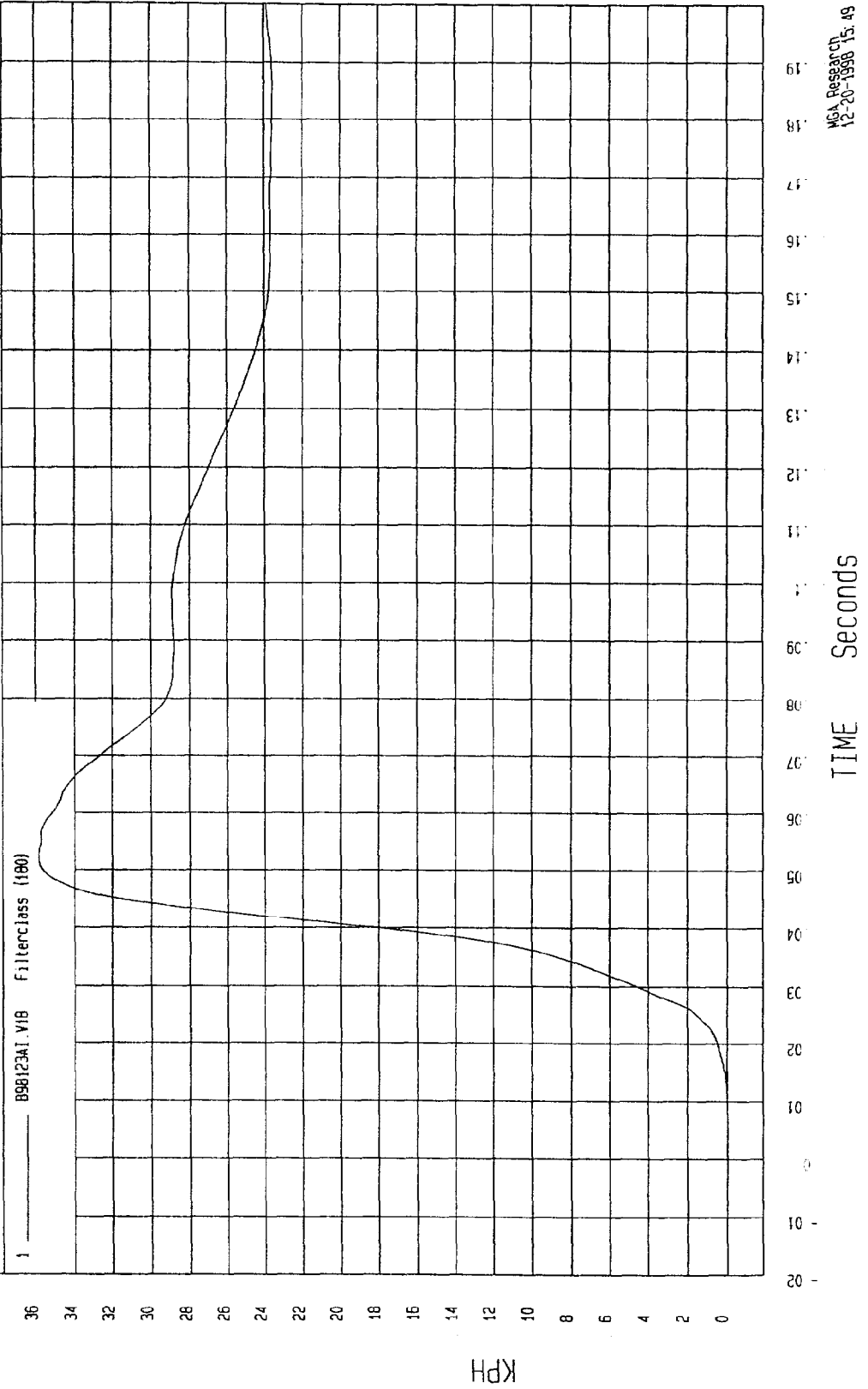
MCA Research
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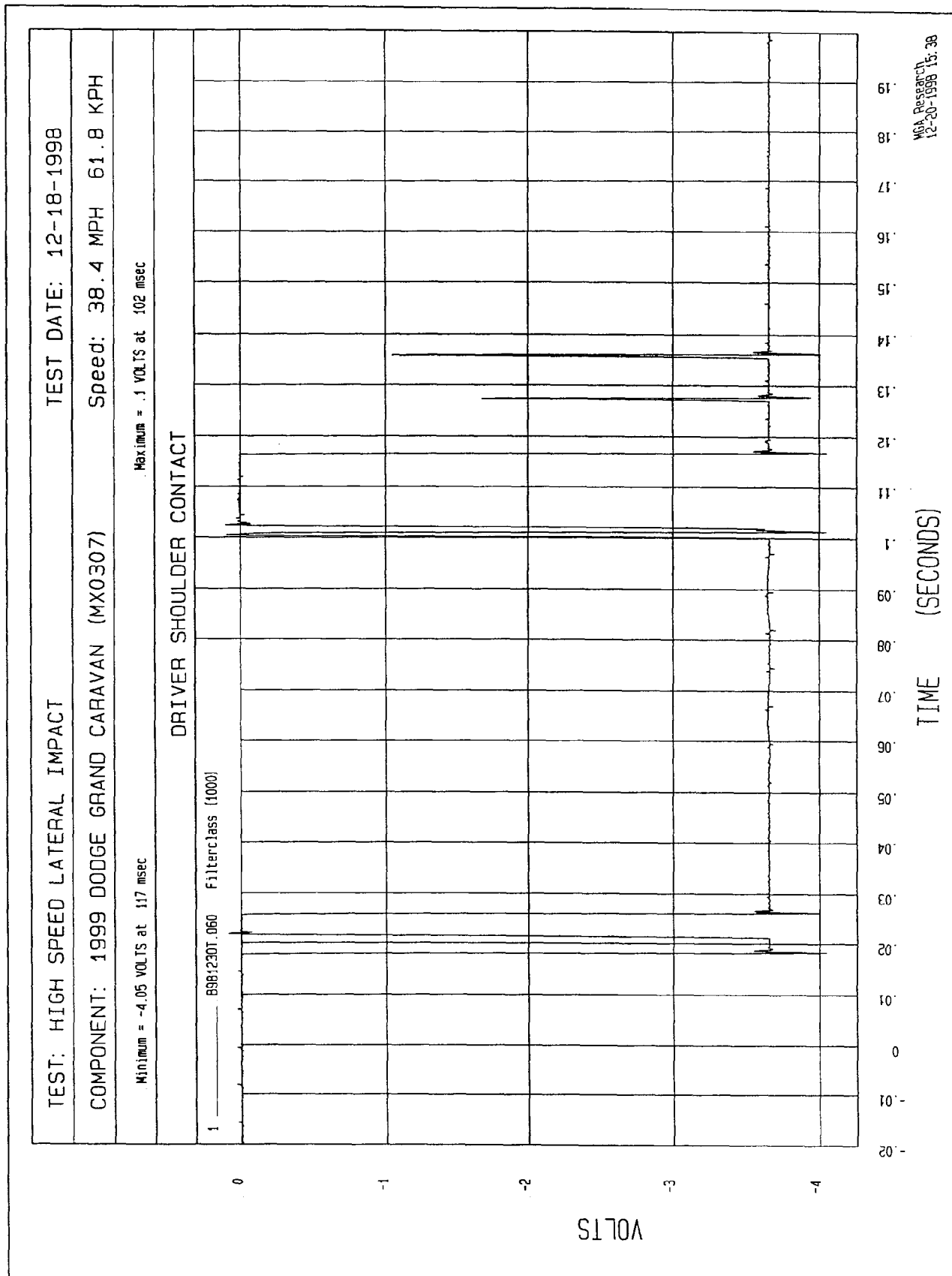
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

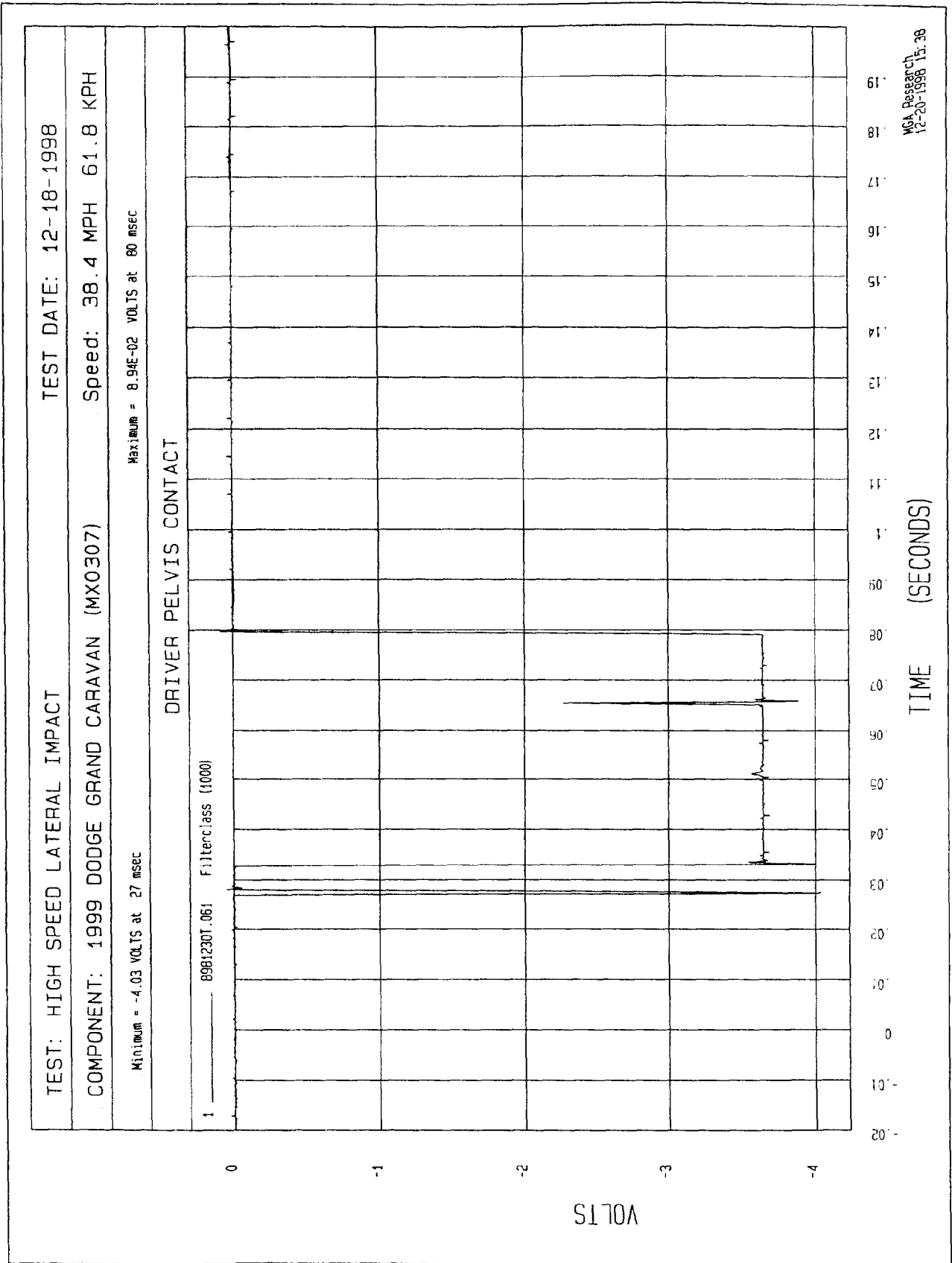
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

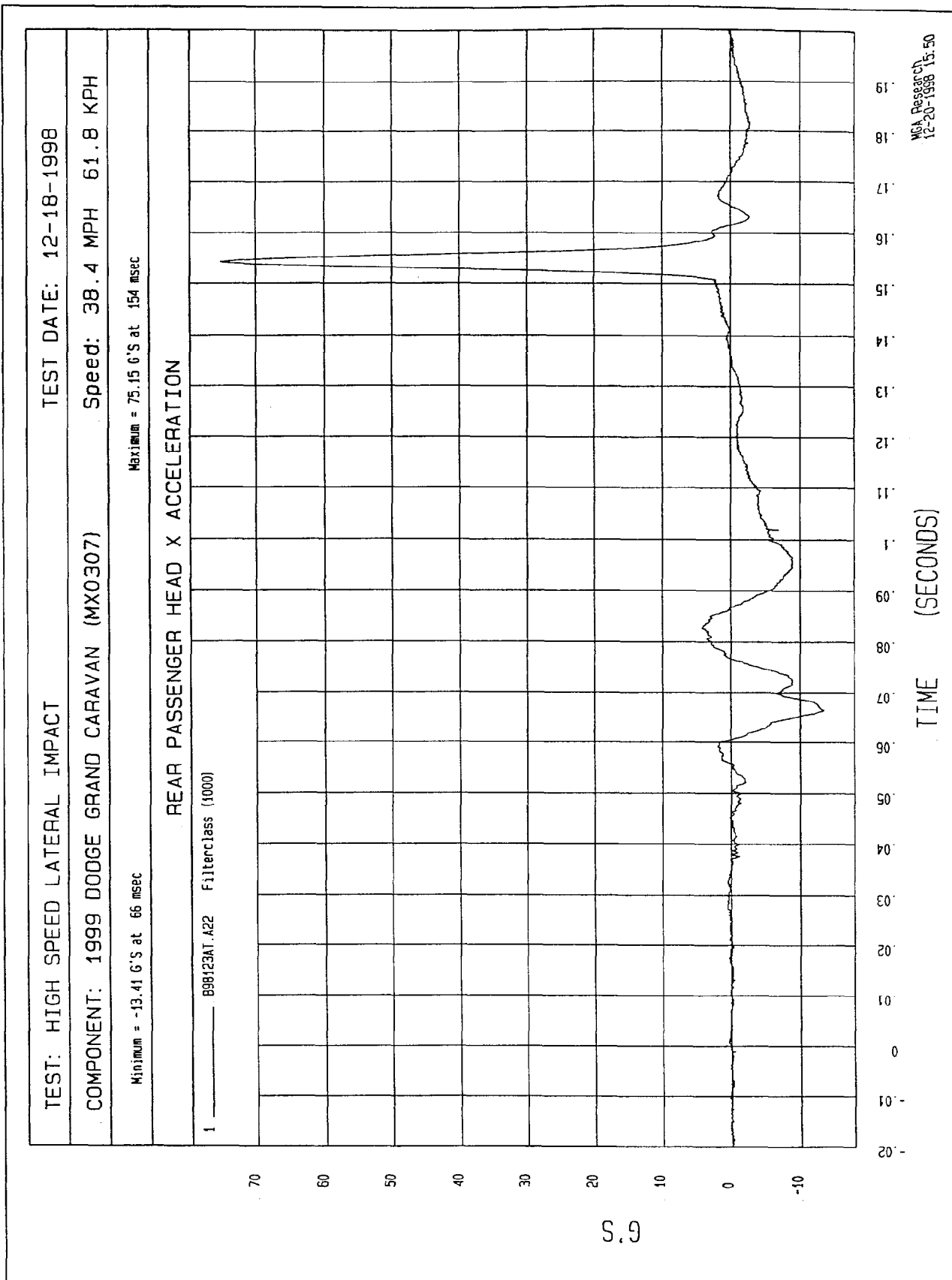
Minimum = -3.47E-02 KPH at -1 msec Maximum = 35.86 KPH at 52 msec

DRIVER PELVIS Y VELOCITY







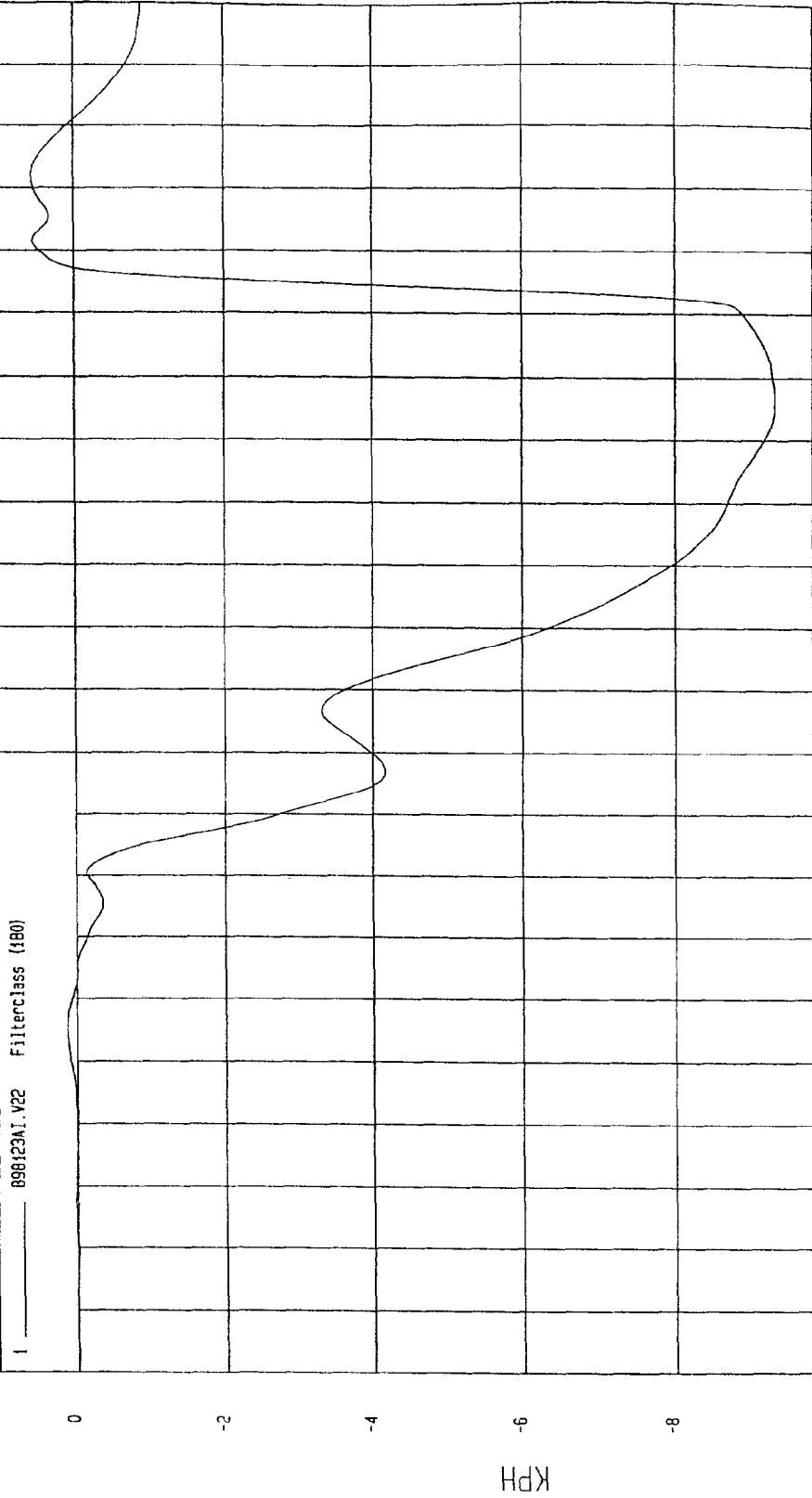


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

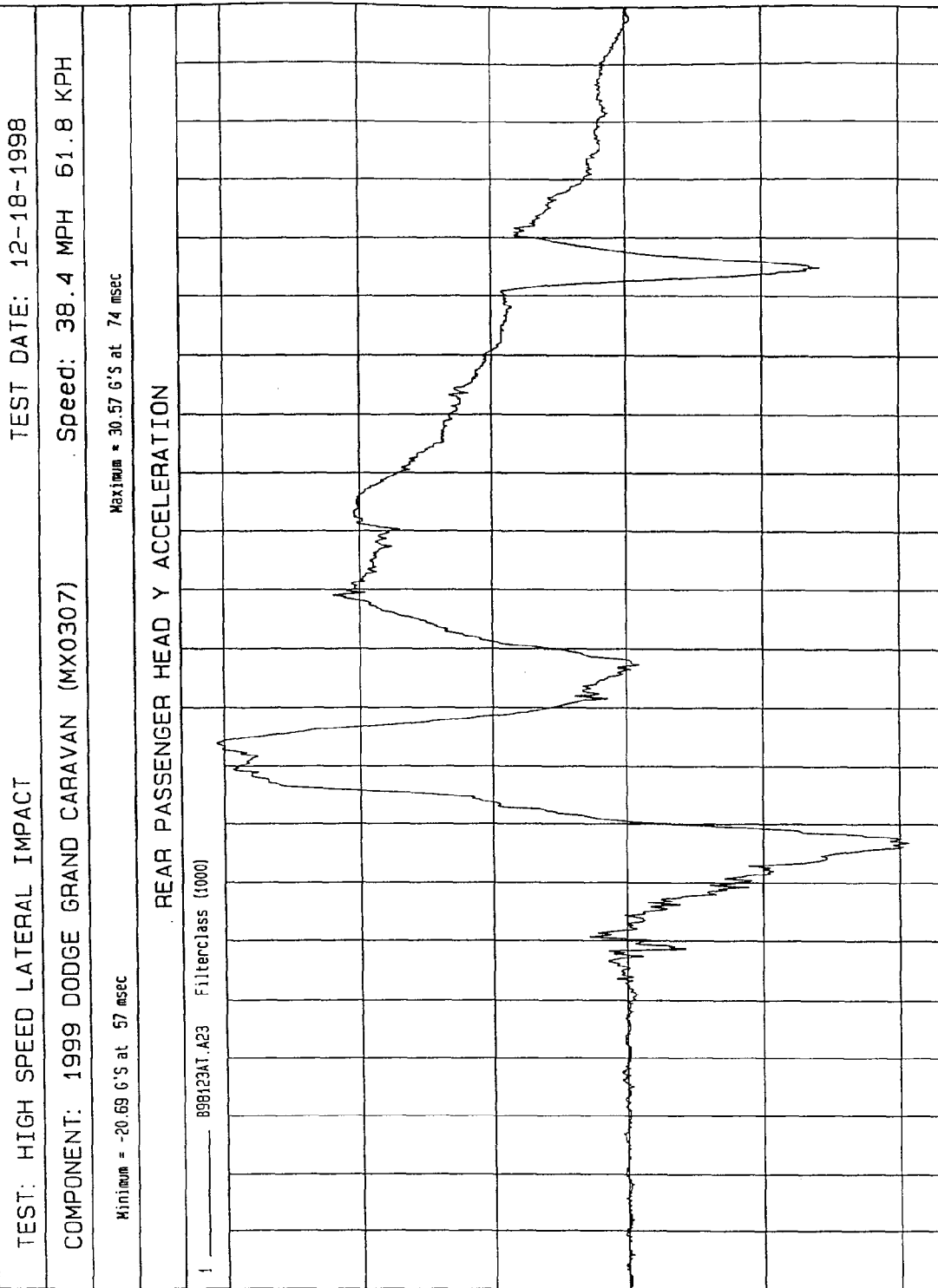
Minimum = -9.29 KPH at 137 msec Maximum = 55 KPH at 172 msec

REAR PASSENGER HEAD X VELOCITY



MCA Research
12-20-1998 15:49

TIME Seconds



MSA Research
12-20-1998 15:50

TIME (SECONDS)

G.S

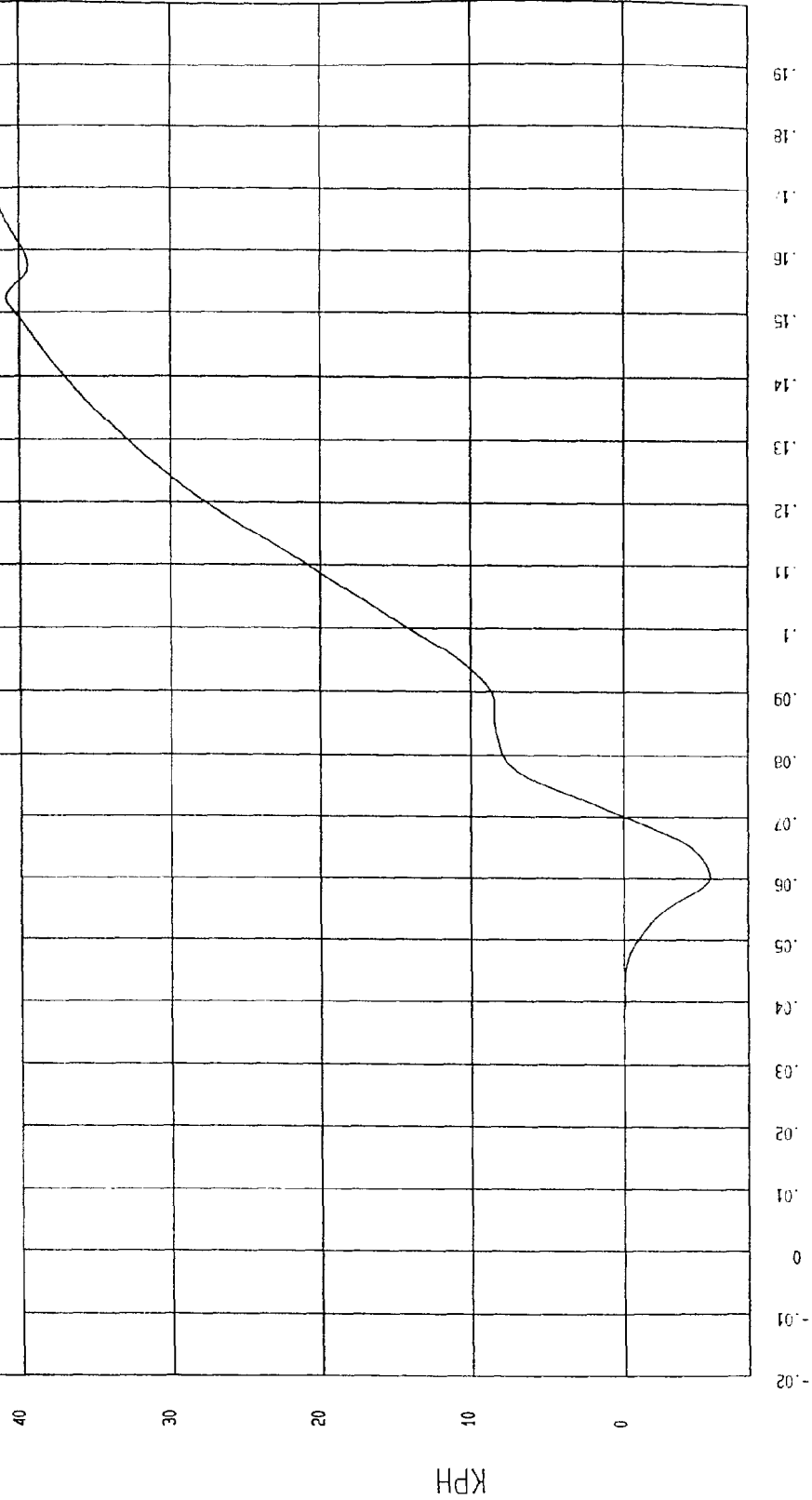
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

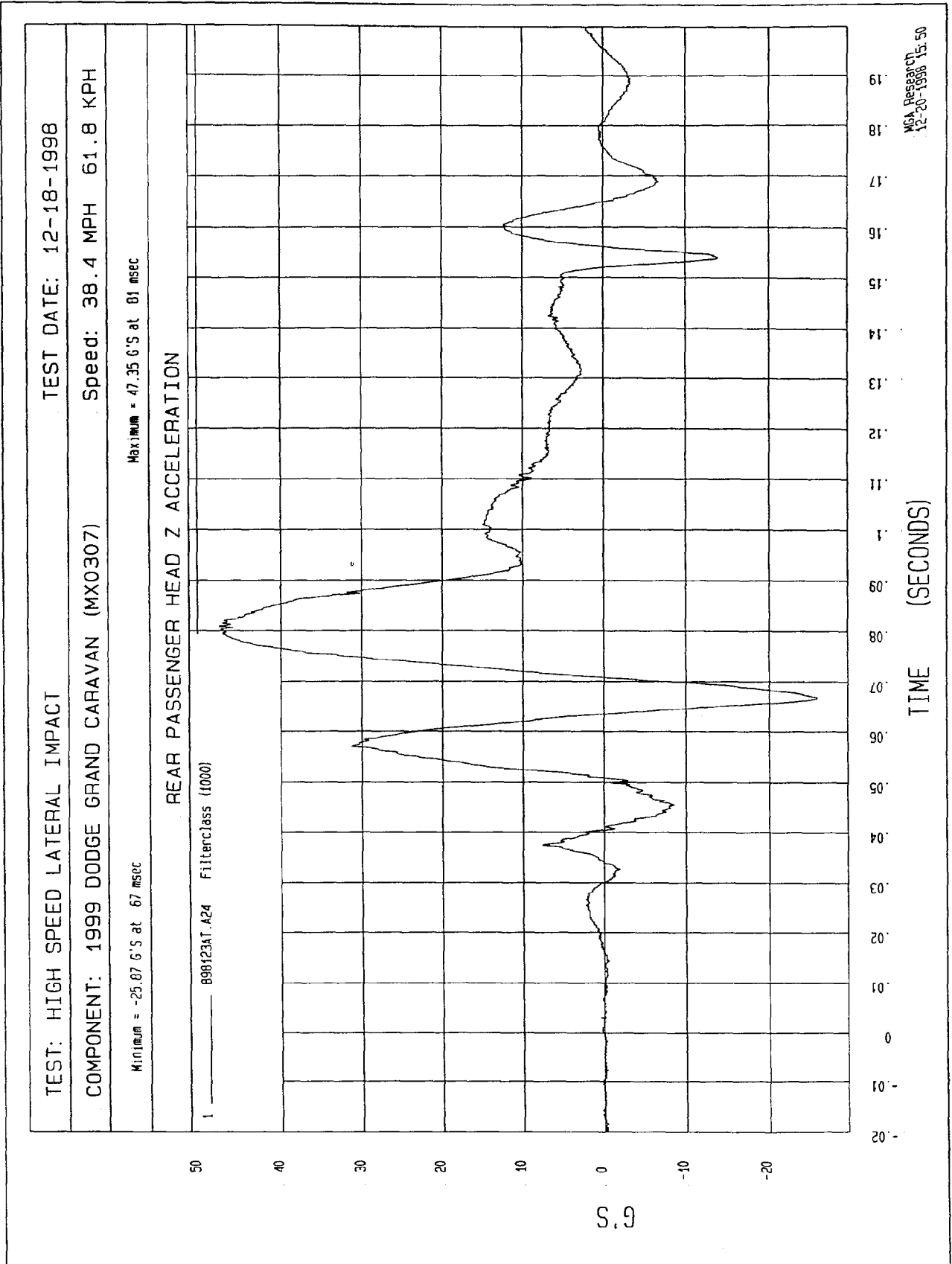
Minimum = -5.72 KPH at 60 msec Maximum = 43.44 KPH at 197 msec

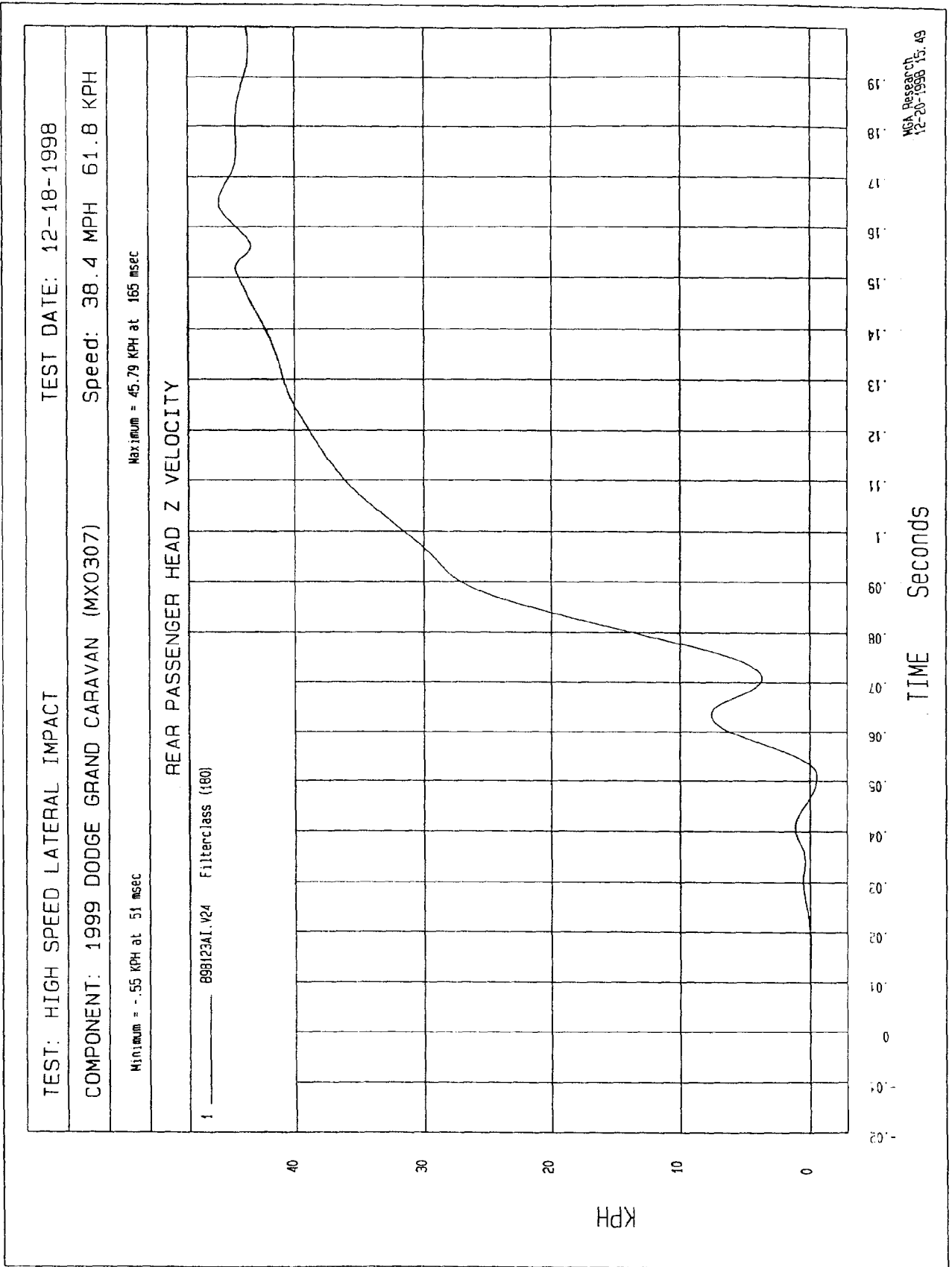
REAR PASSENGER HEAD Y VELOCITY

1 _____ B98123A1.V23 FilterClass (180)



WGA Research
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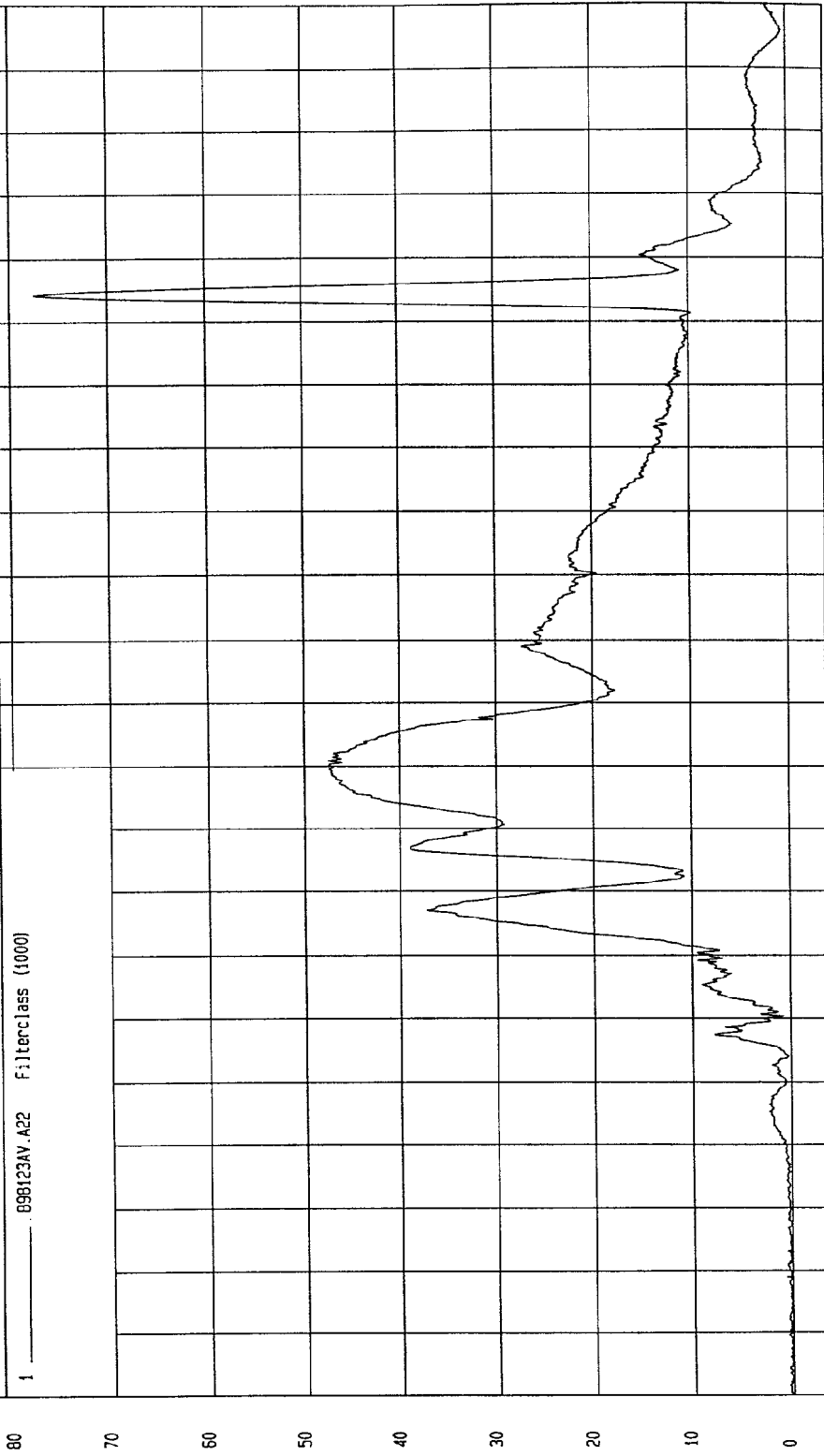


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 0.00E+02 G'S at -17 msec Maximum = 77.47 G'S at 154 msec

REAR PASSENGER HEAD RESULTANT



NSA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

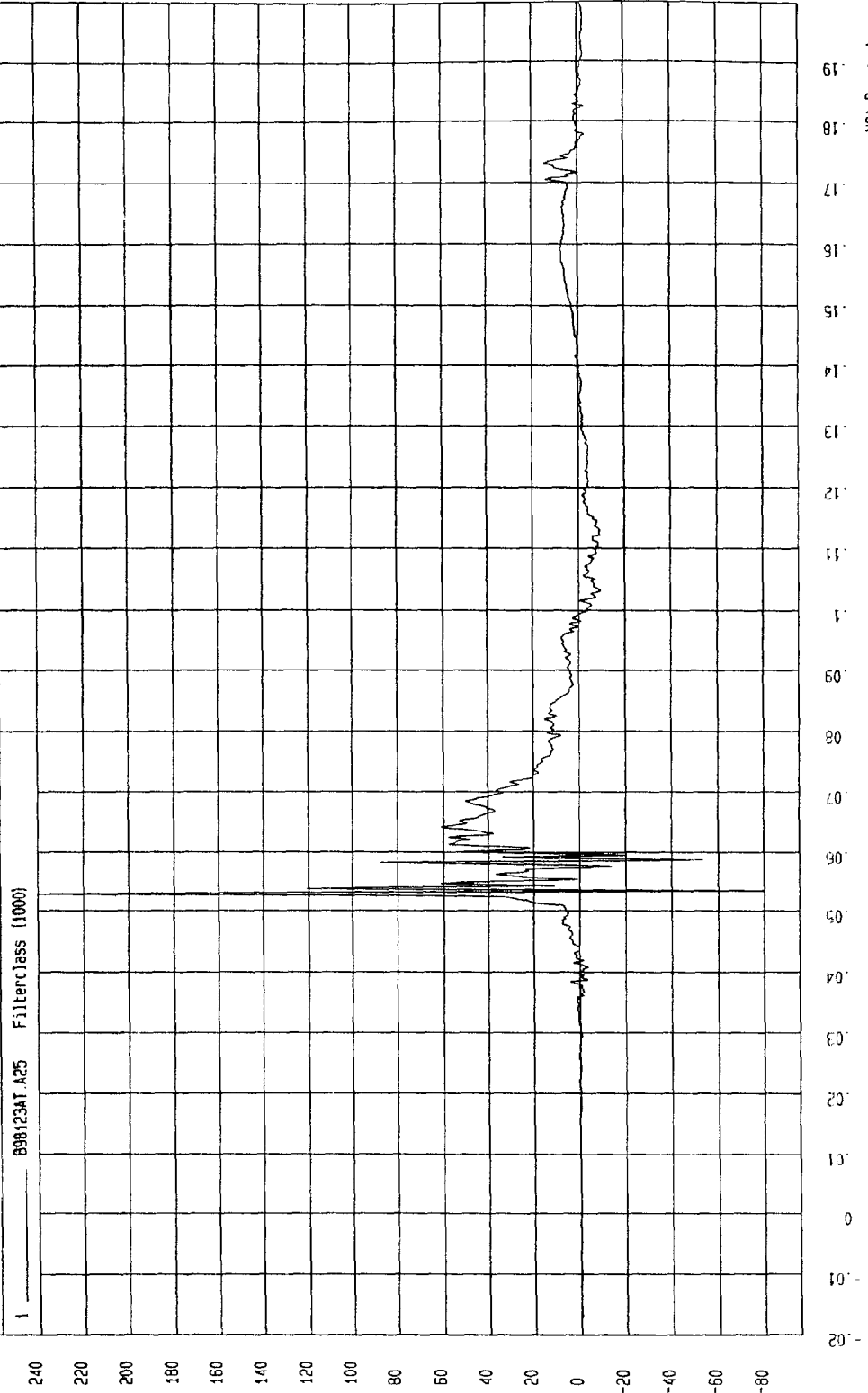
SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 240.6 G'S at 53 msec

Minimum = -79.61 G'S at 53 msec

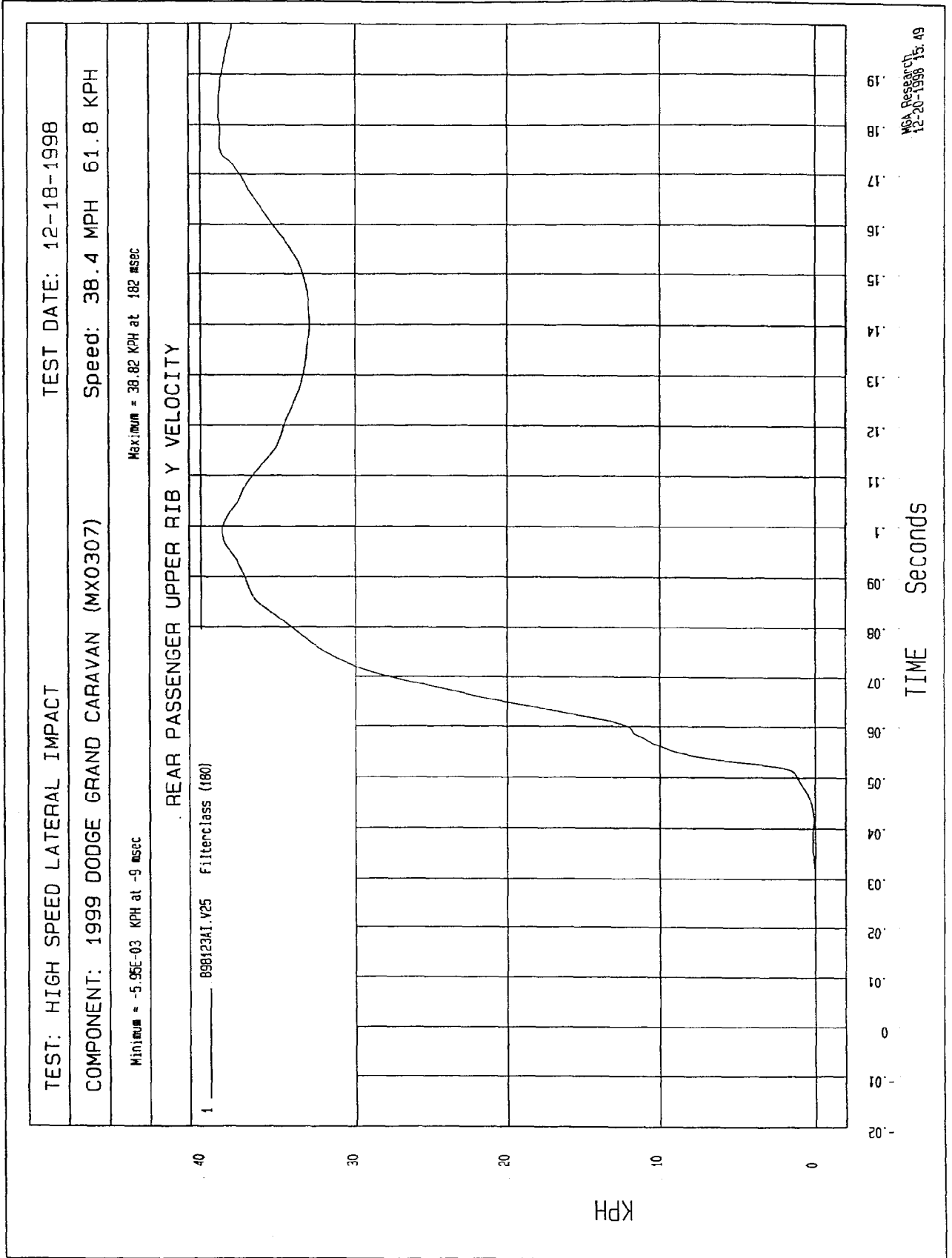
REAR PASSENGER UPPER RIB Y ACCELERATION



MCA Research
12-20-1998 15:50

TIME (SECONDS)

G.S



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

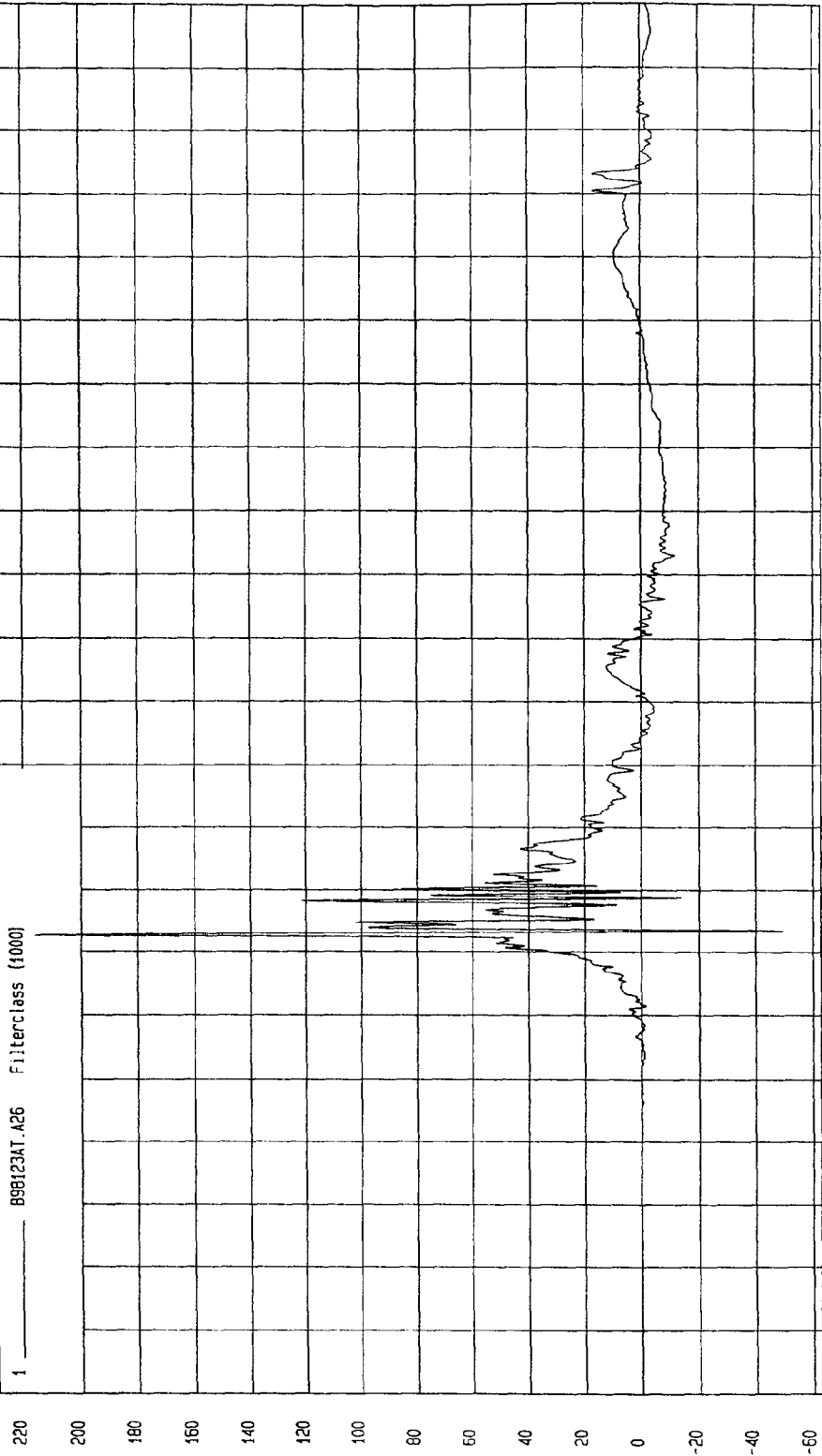
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -49.54 G'S at 53 msec

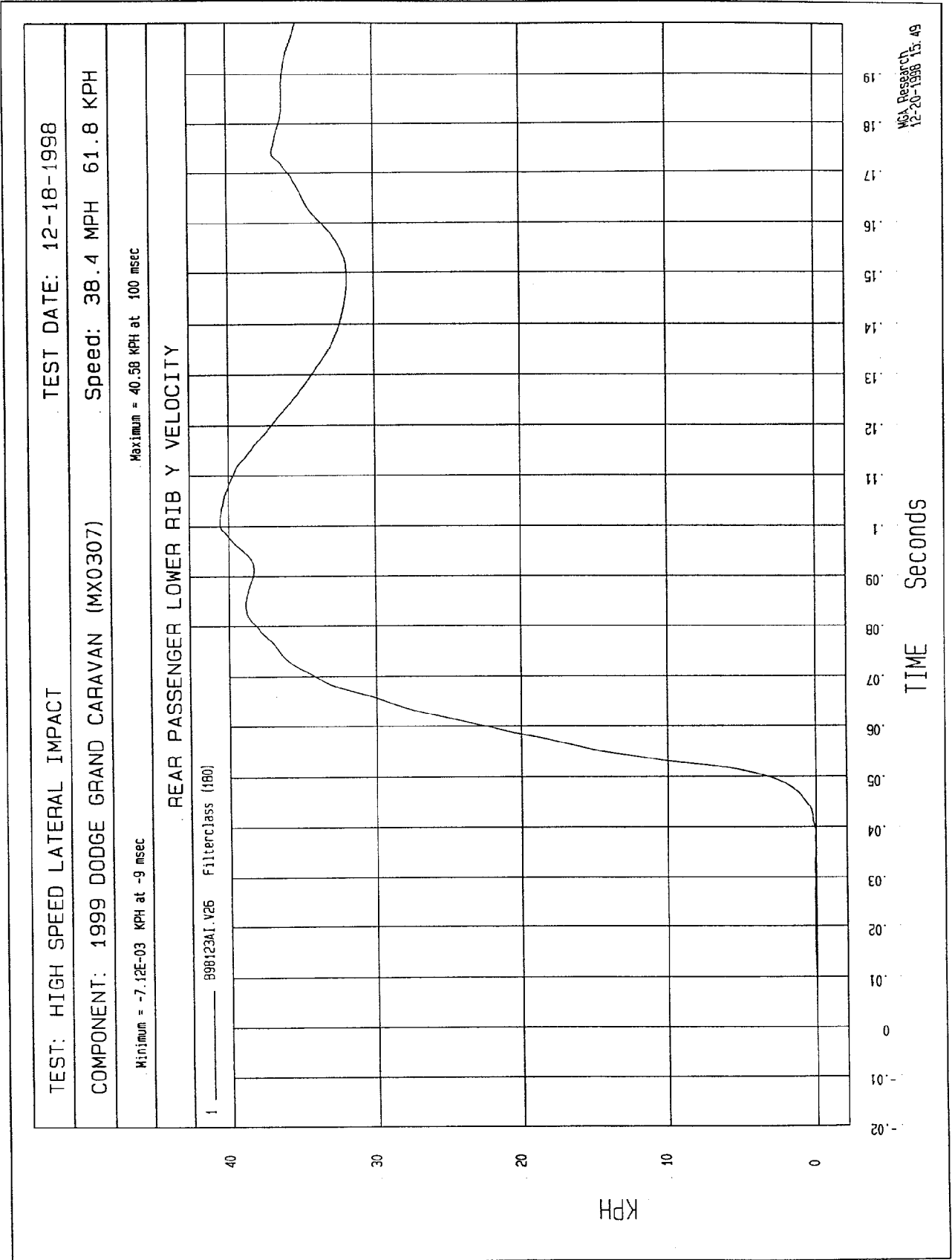
Maximum = 215.98 G'S at 53 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 898123AT.A26 Filterclass (1000)



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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 108.85 G'S at 51 msec

Minimum = -7.85 G'S at 121 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 890123AF.A27 FilterClass (180)

100

80

60

40

20

0

G.S.

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

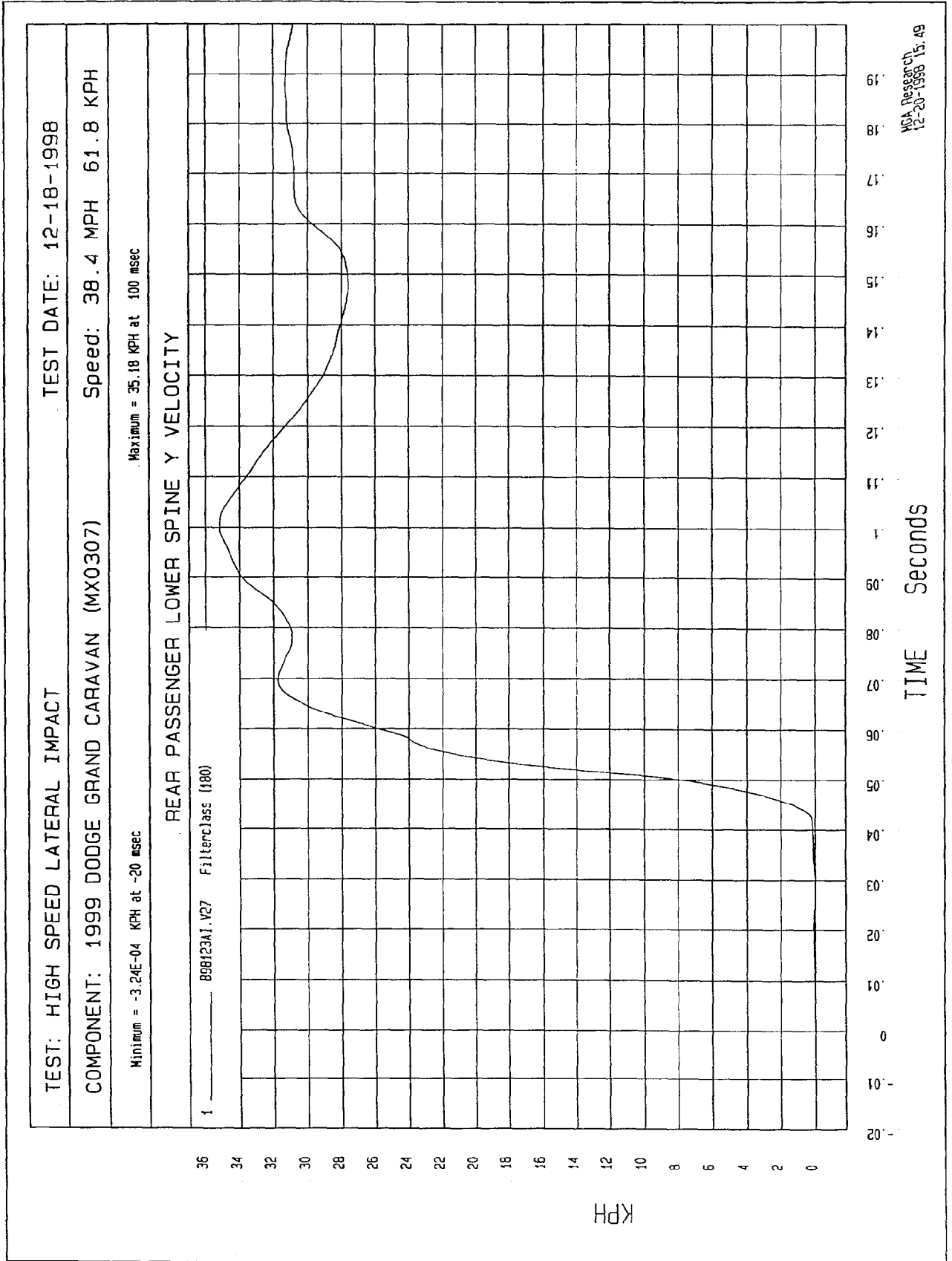
38

39

40

TIME (SECONDS)

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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -23.37 G'S at 55 msec Maximum = 139.52 G'S at 45 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 — 898123AT.A28 Filterclass (1000)

140

120

100

80

60

40

20

0

-20

G.S

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TIME (SECONDS)

-0.02

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

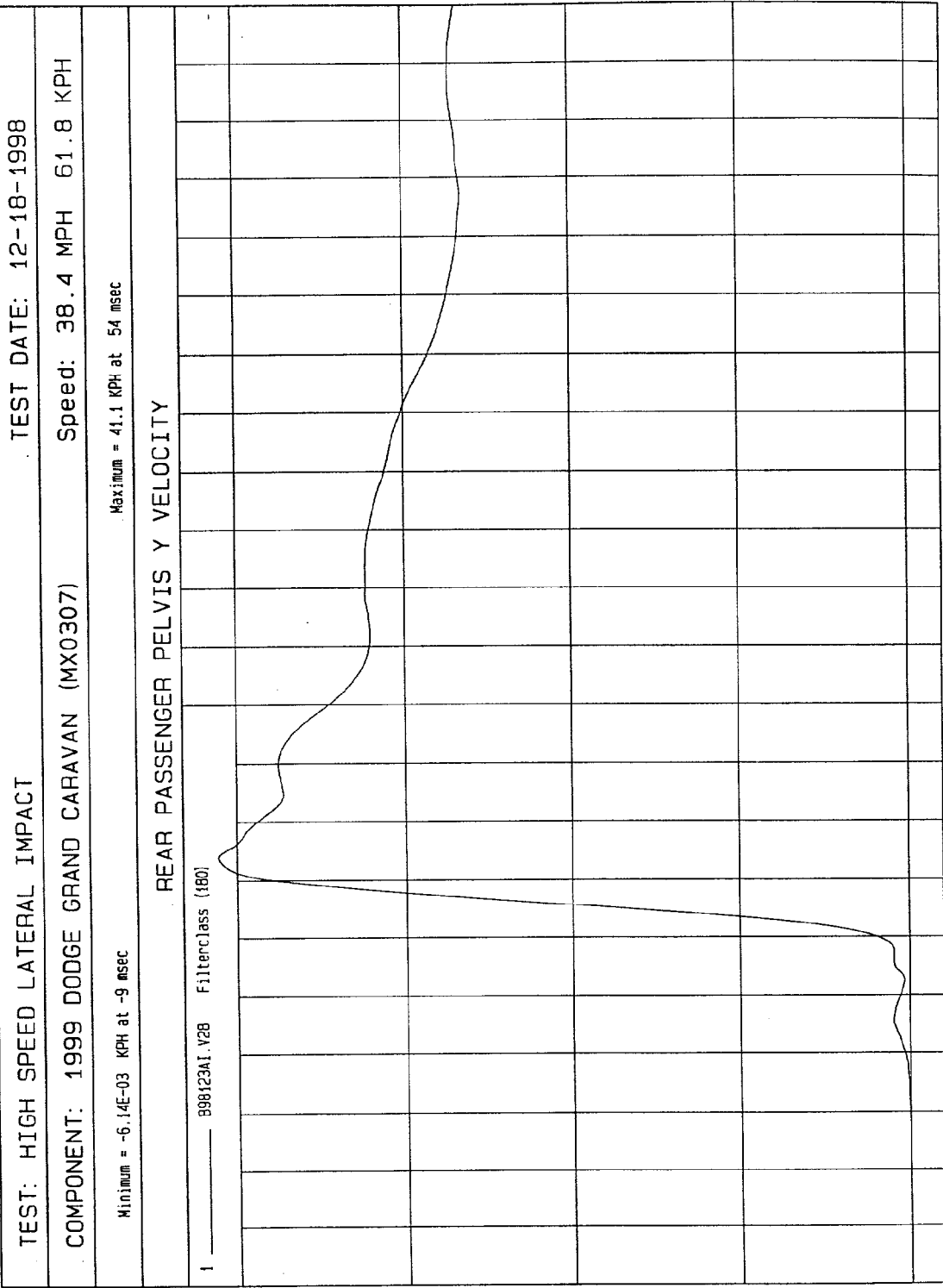
0.15

0.16

0.17

0.18

0.19



MSA Research
12-20-1998 15.49

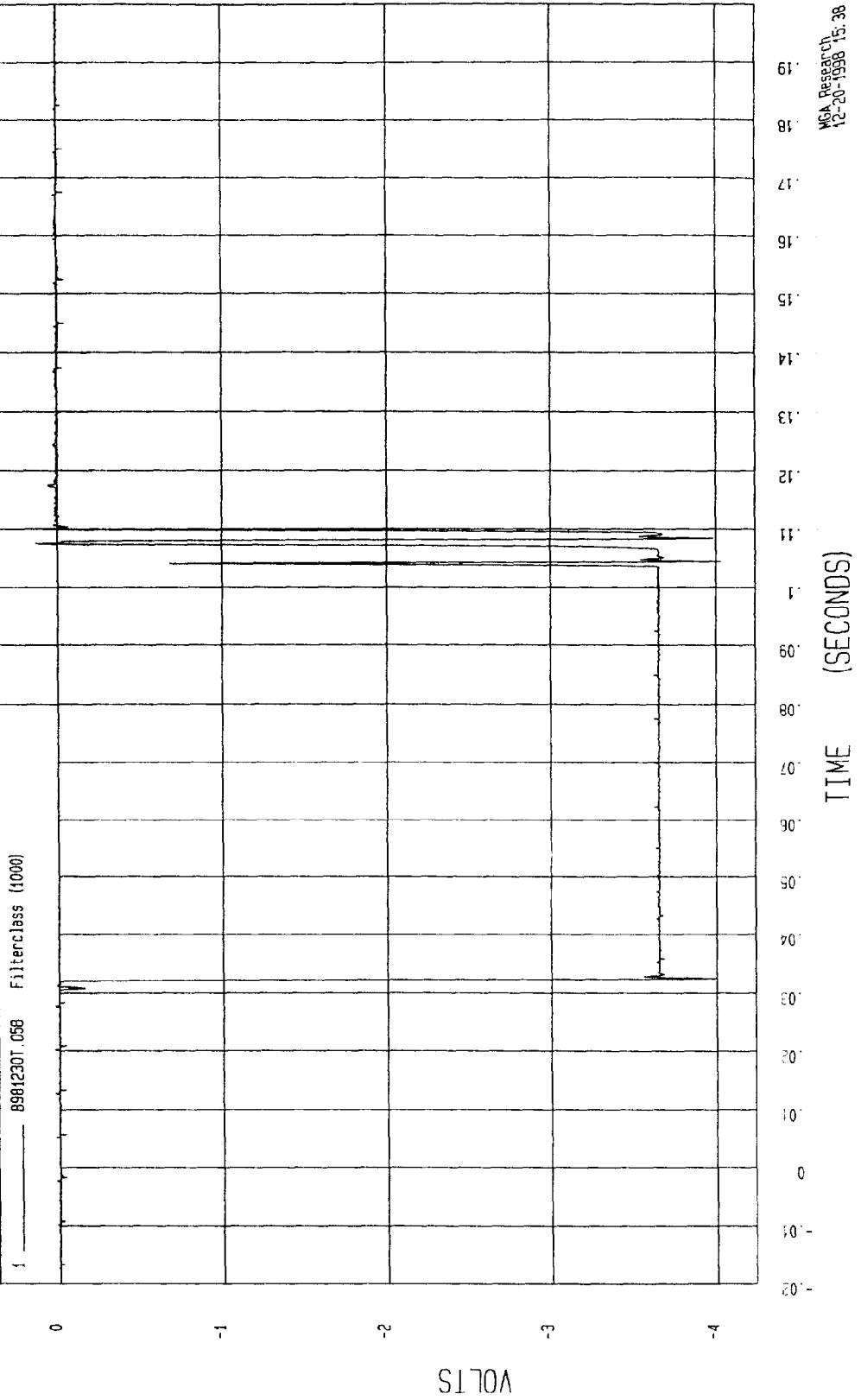
TIME Seconds

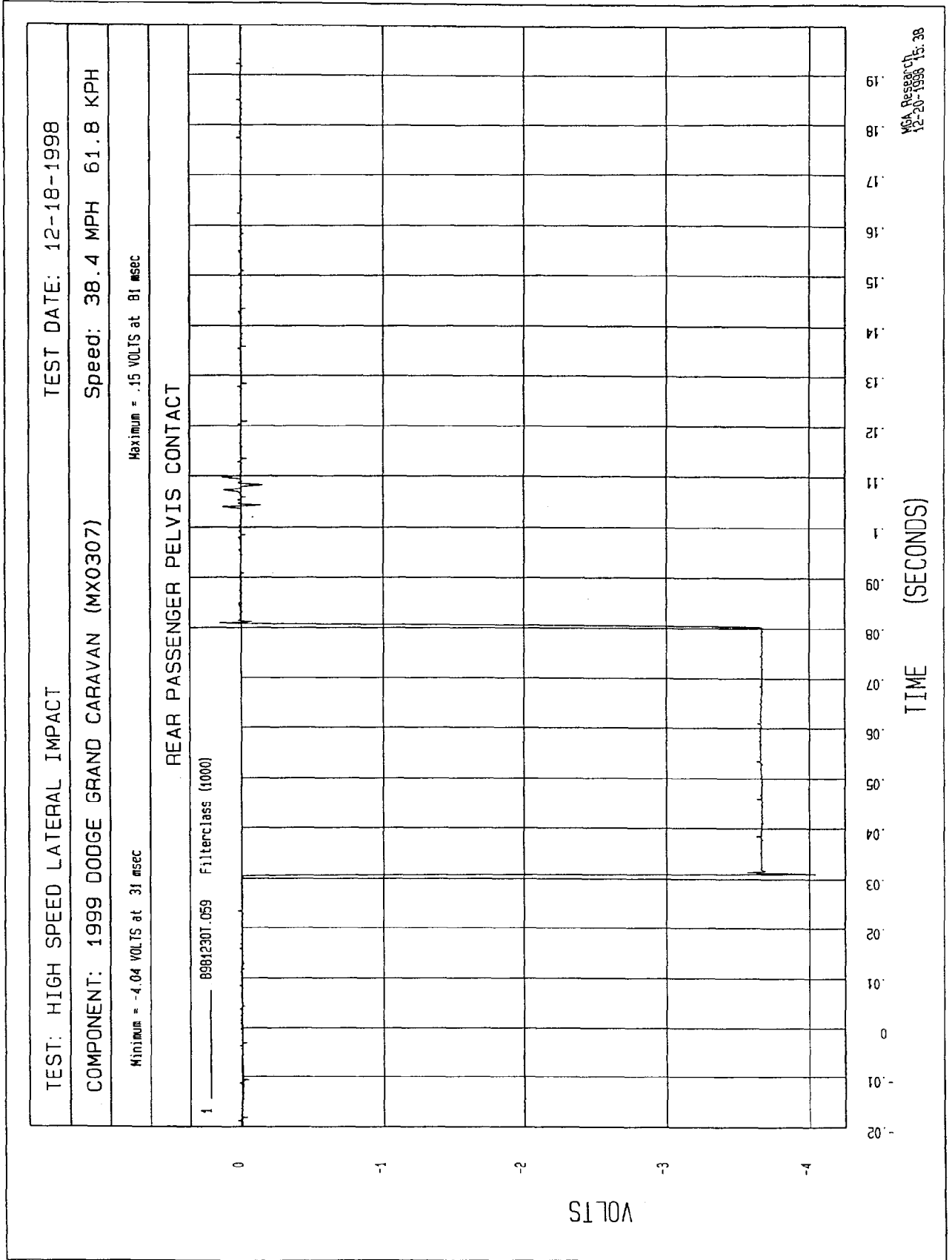
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

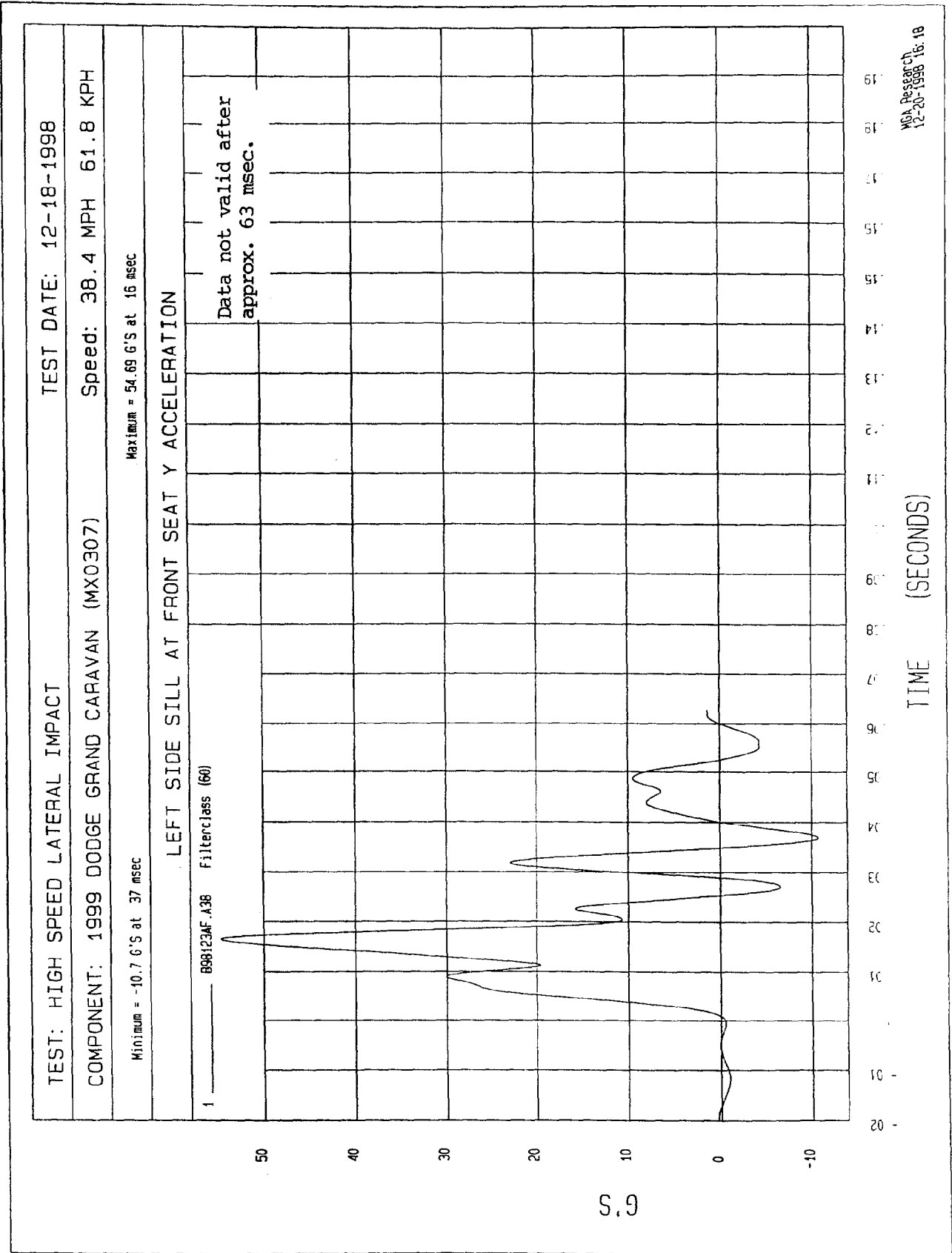
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

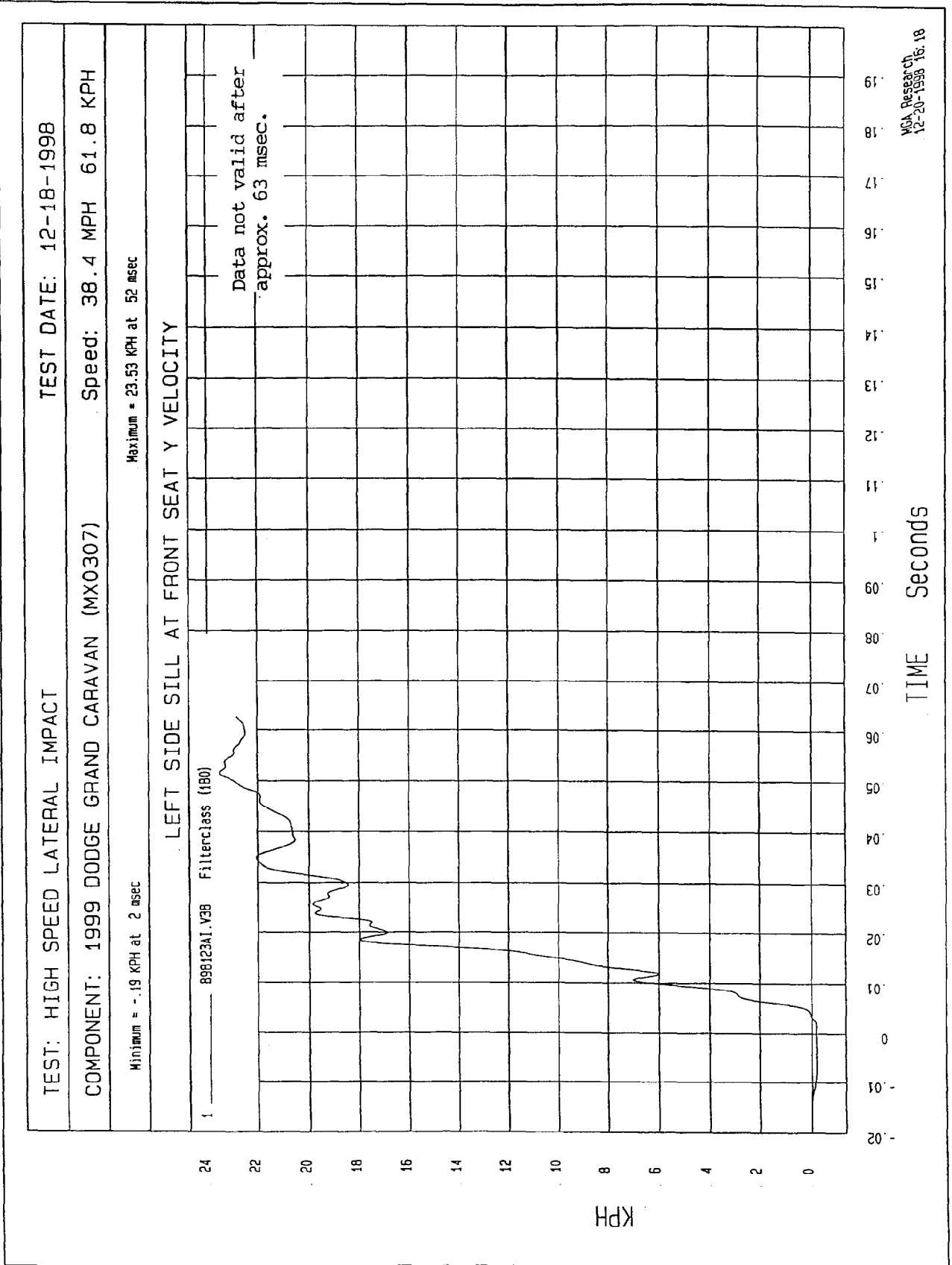
Minimum = -4.03 VOLTS at 104 msec Maximum = .15 VOLTS at 110 msec

REAR PASSENGER SHOULDER CONTACT







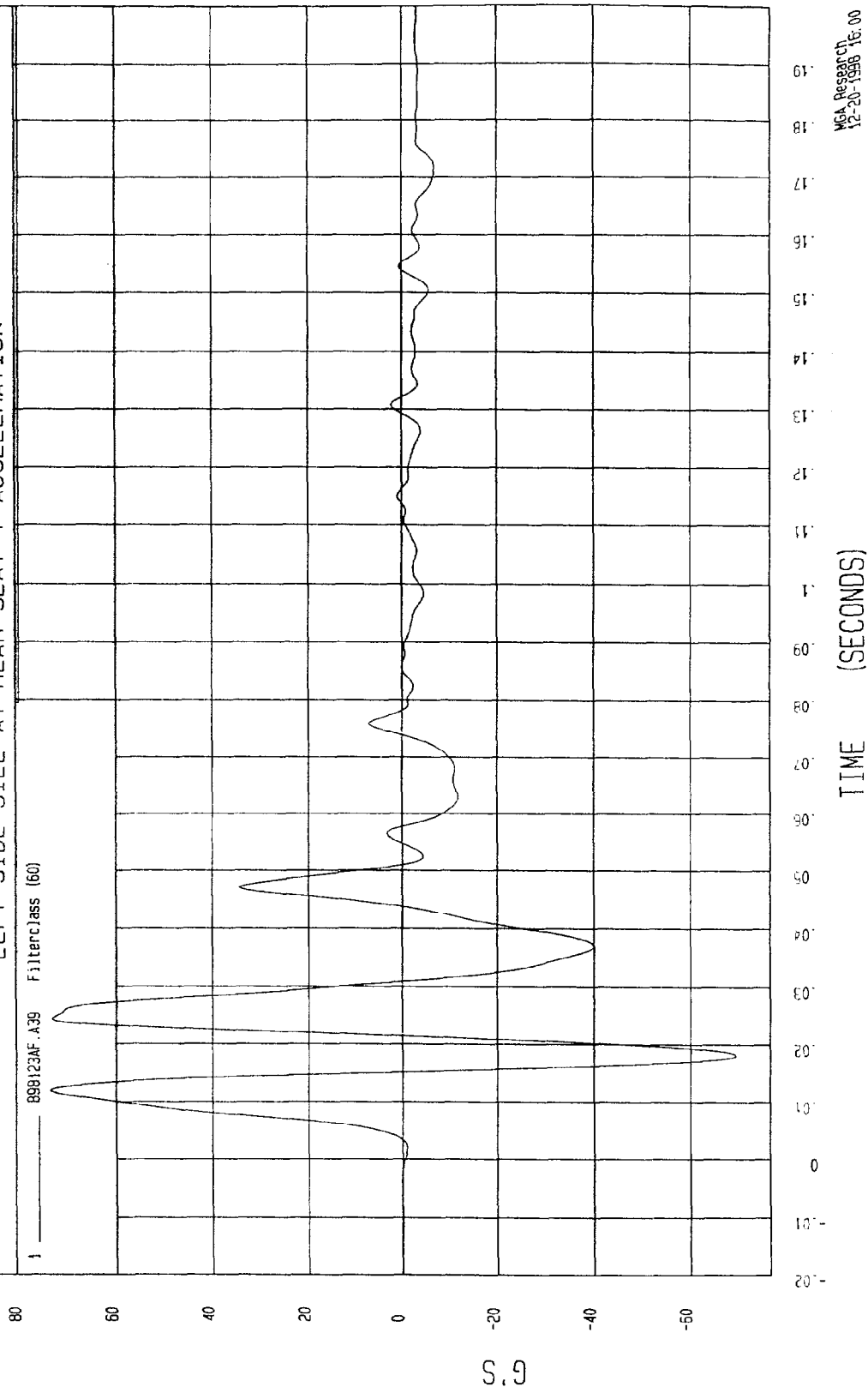


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -69.28 G'S at 18 msec Maximum = 73.54 G'S at 12 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION

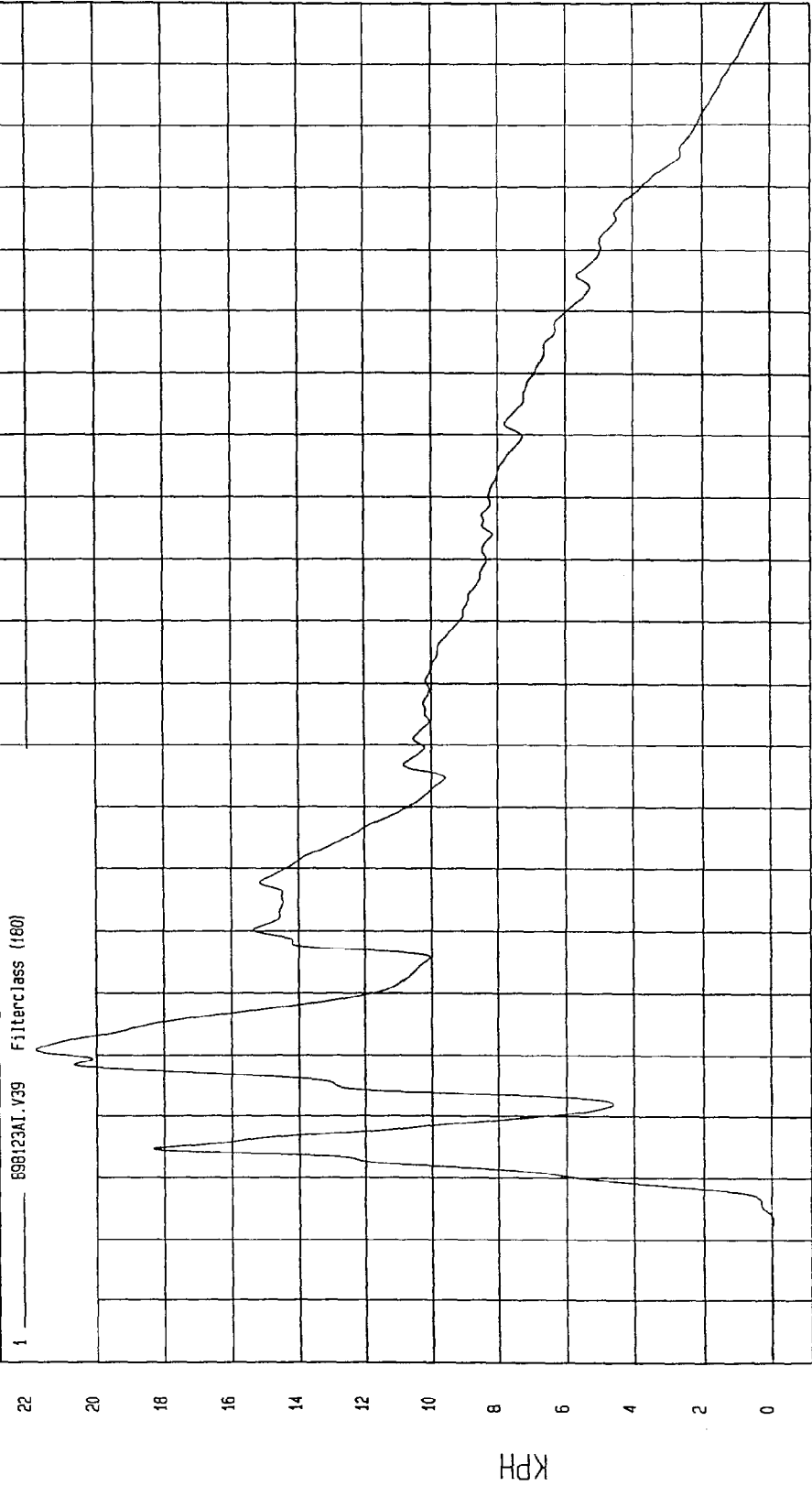


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -4.12E-02 KPH at 3 msec Maximum = 21.77 KPH at 31 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY



TIME Seconds

MCA Research
12-20-1998 16:00

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

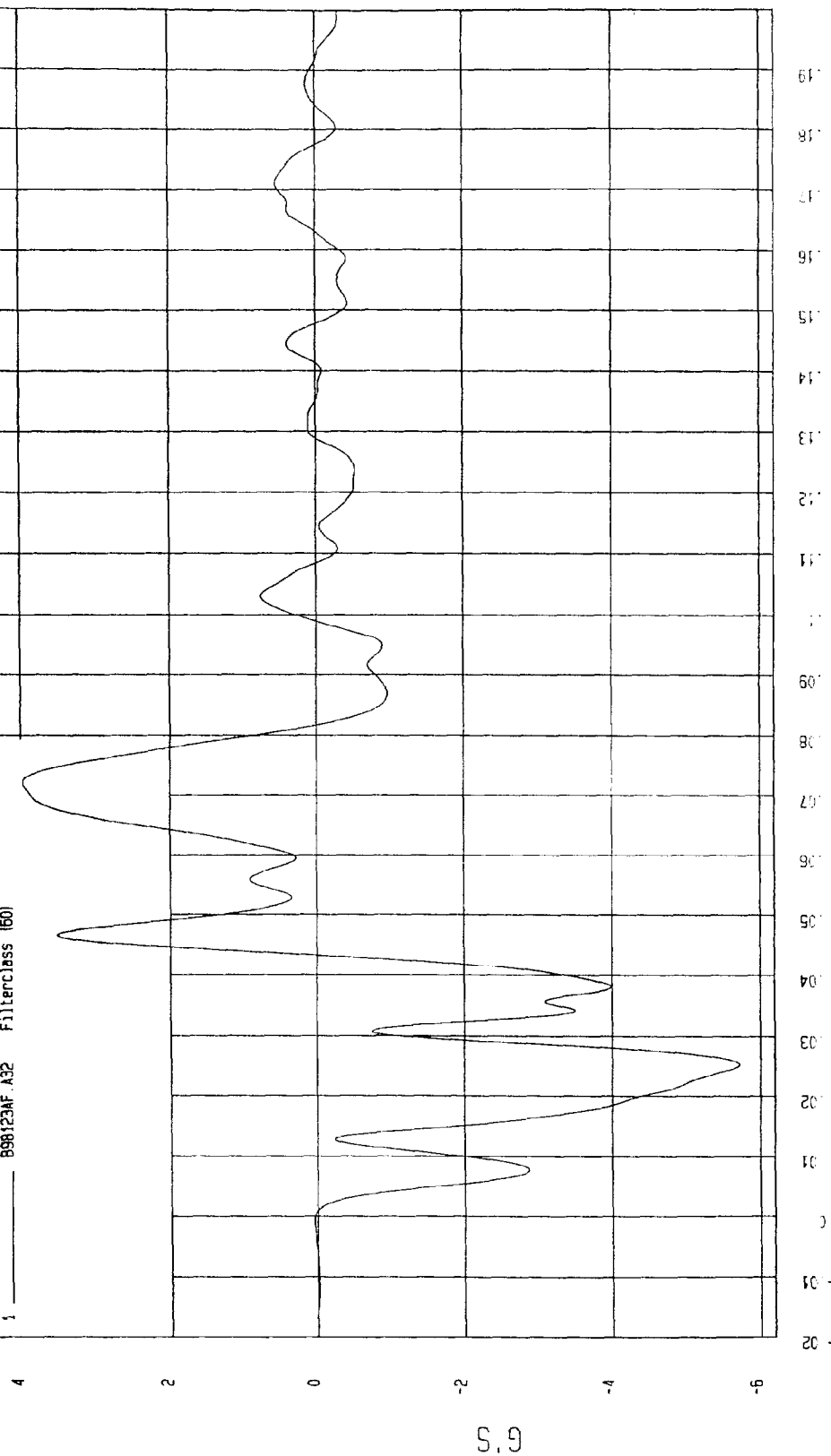
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

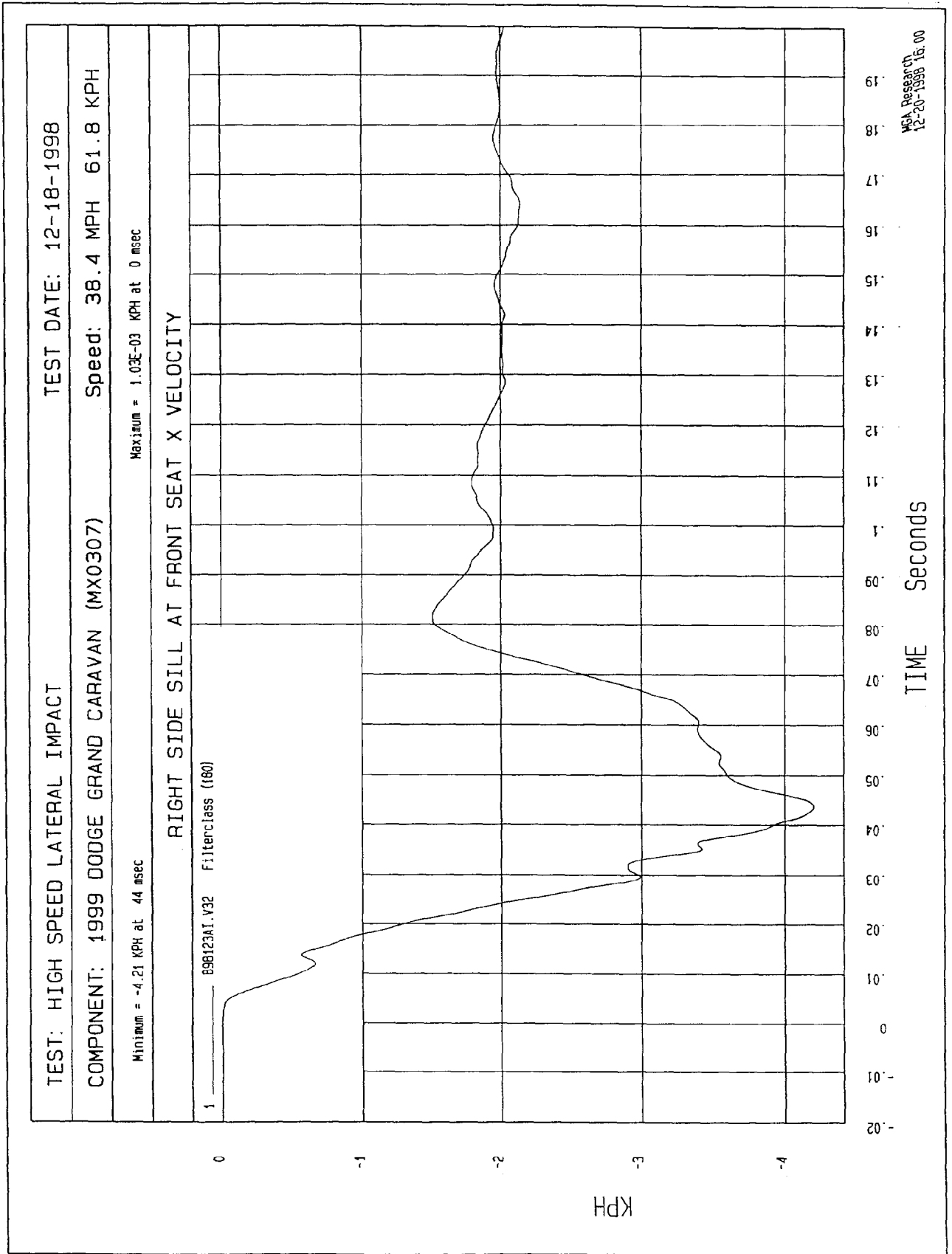
Maximum = 3.96 G'S at 72 msec

Minimum = -5.71 G'S at 25 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 ——— B98123AF A32 Filterclass (60)

MCA Research
12-20-1998 16:00

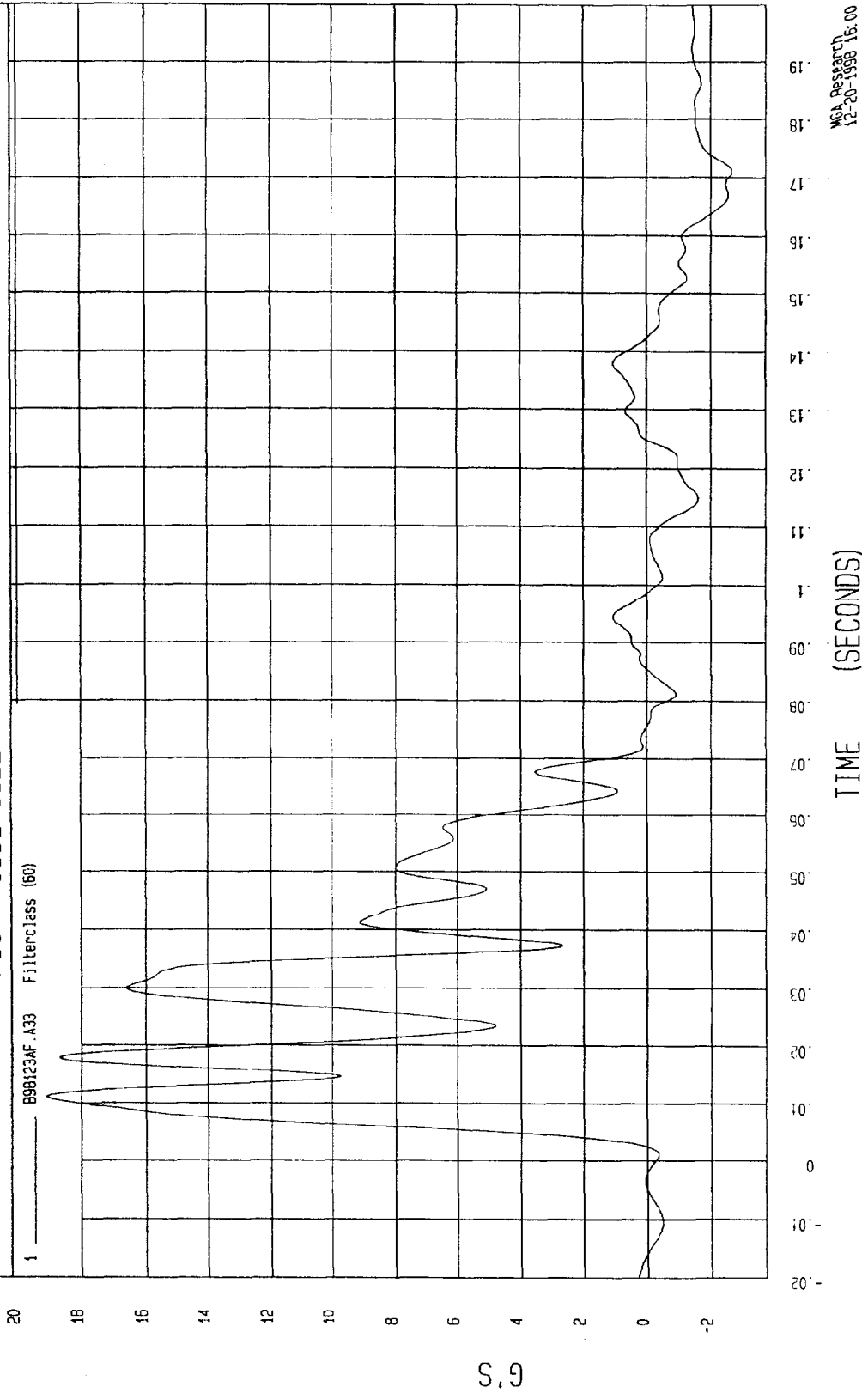


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -2.66 G'S at 171 msec Maximum = 19.1 G'S at 11 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

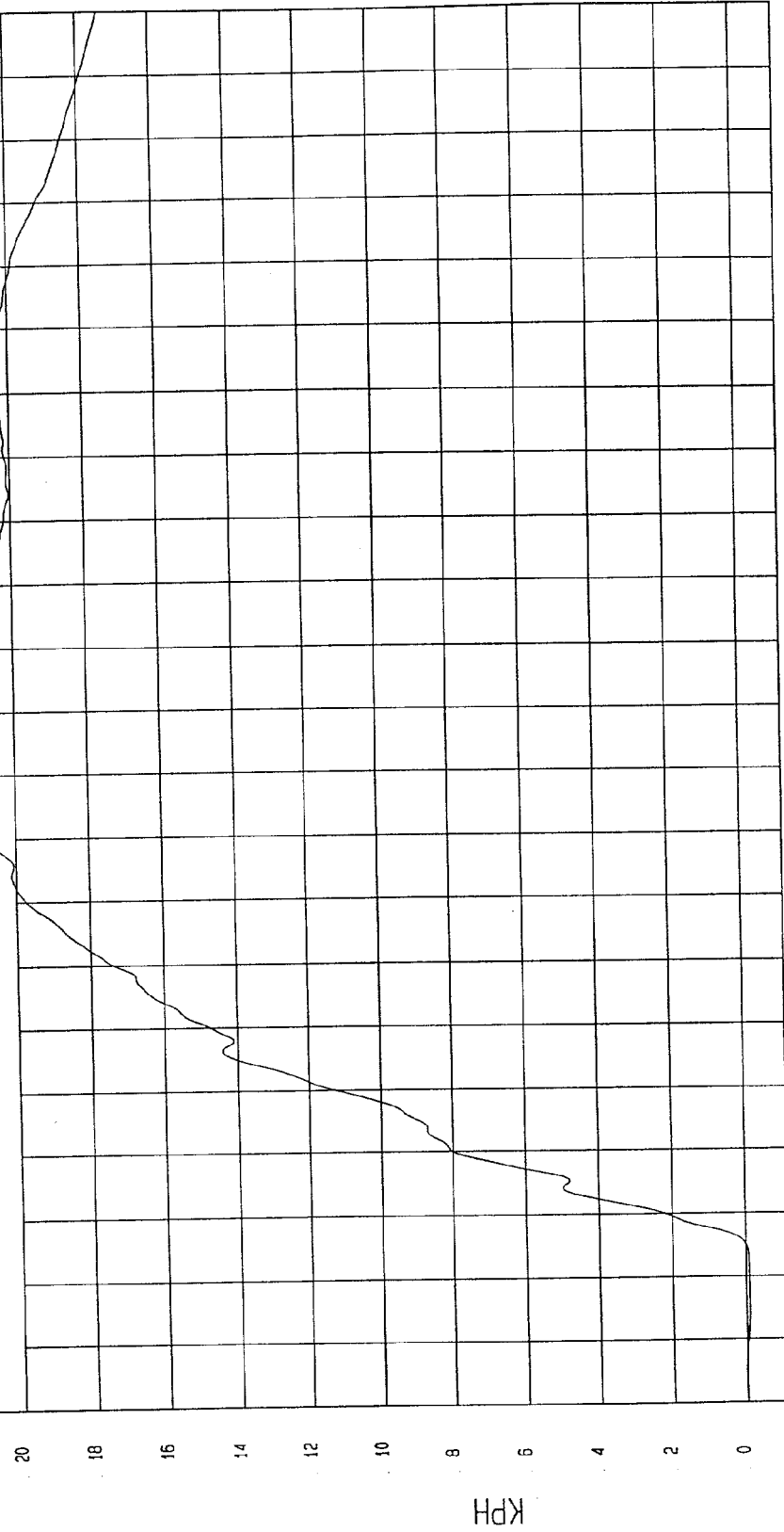
TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -9.10E-02 KPH at -5 msec Maximum = 20.73 KPH at 100 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

1 B98123A1.V33 Filterclass (180)



NSA Research
12-20-1998 16:01

TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

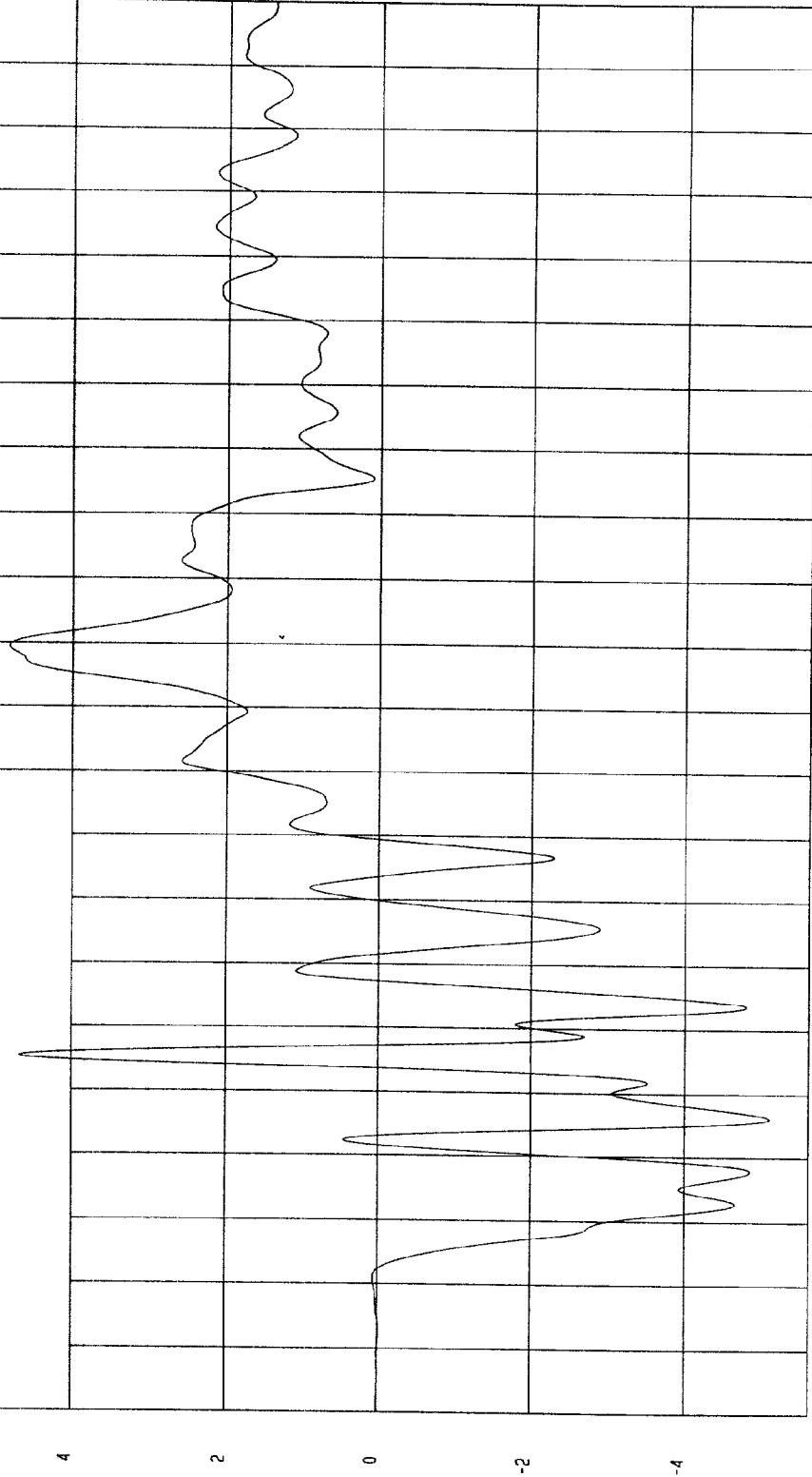
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 4.82 G'S at 100 msec

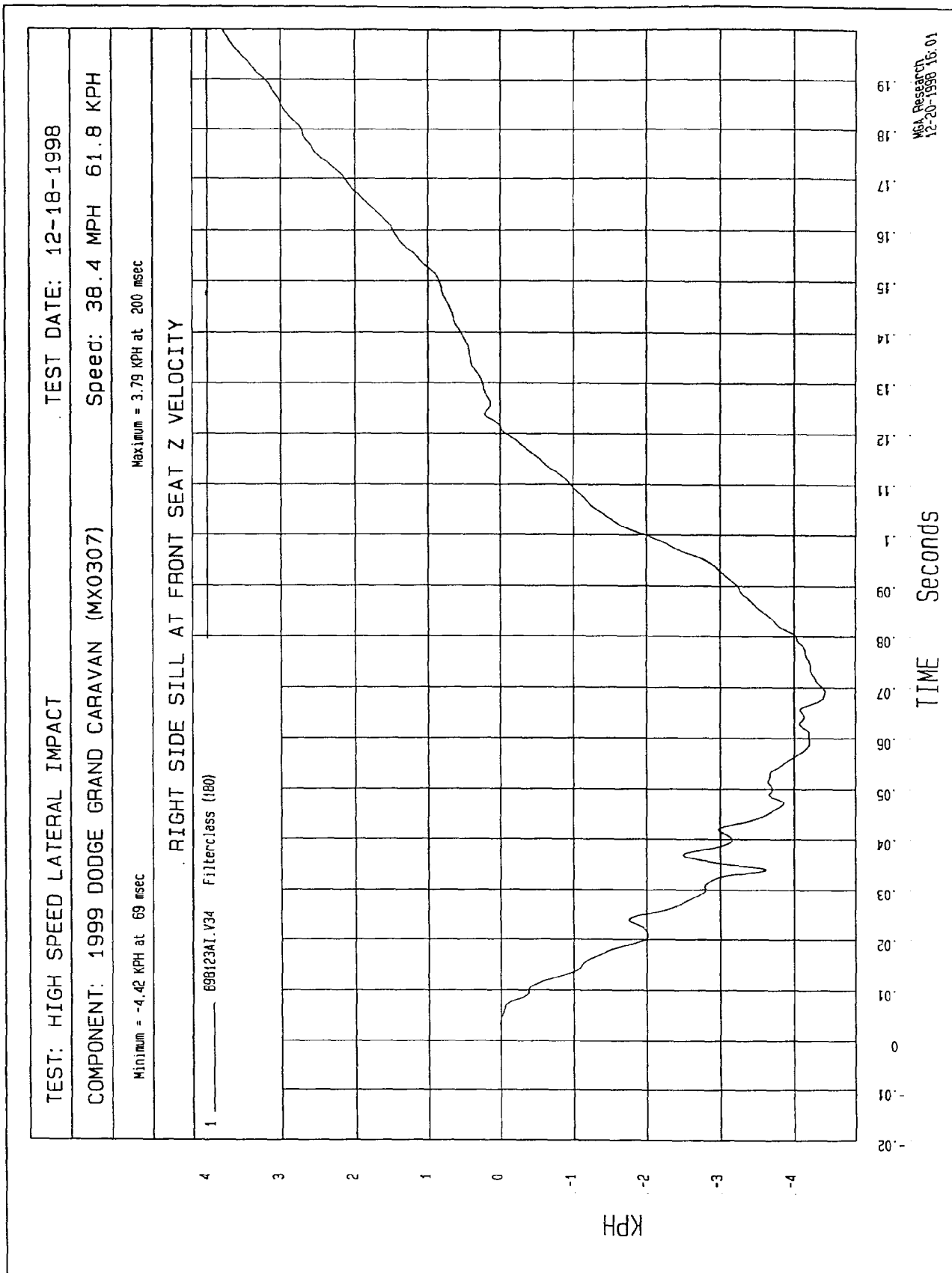
Minimum = -5.1 G'S at 26 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION

1 ——— B98123AF.A34 Filterclass (60)



MGA Research
12-20-1998 16:01

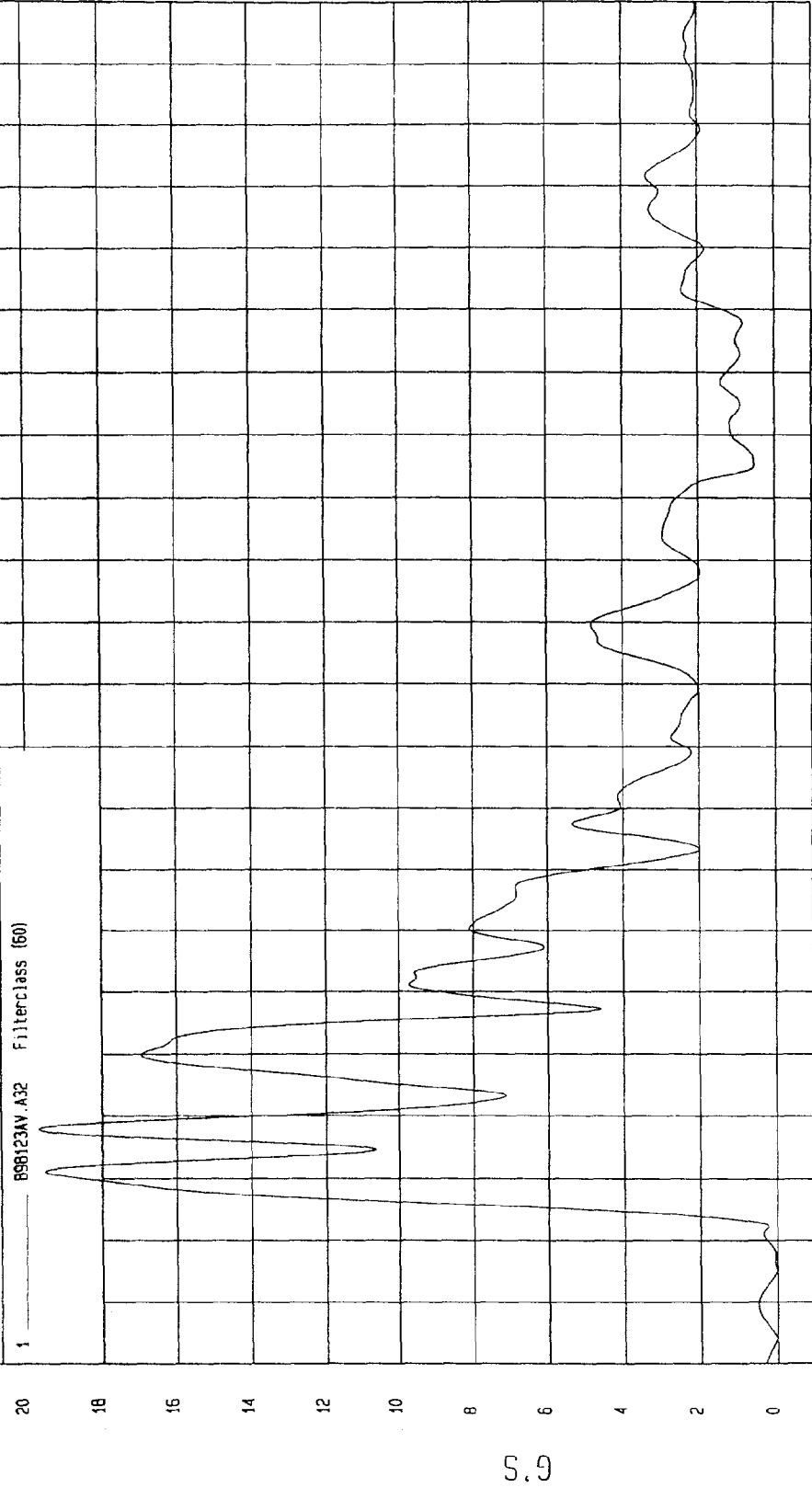


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = .01 G'S at -16 msec Maximum = 19.67 G'S at 18 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



TIME (SECONDS)

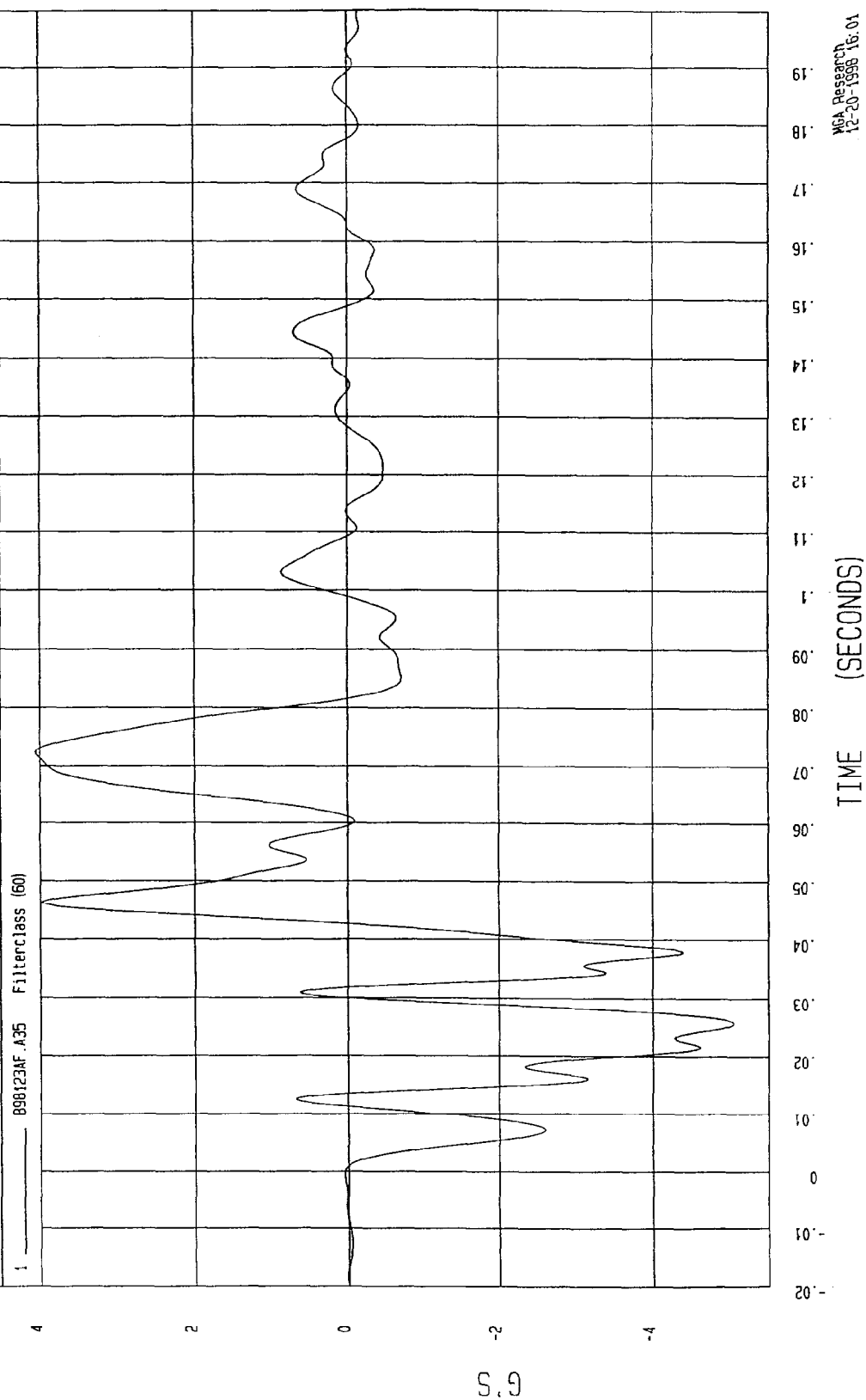
MOA Research
12-20-1998 16:01

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -5.04 G'S at 26 msec Maximum = 4.05 G'S at 72 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

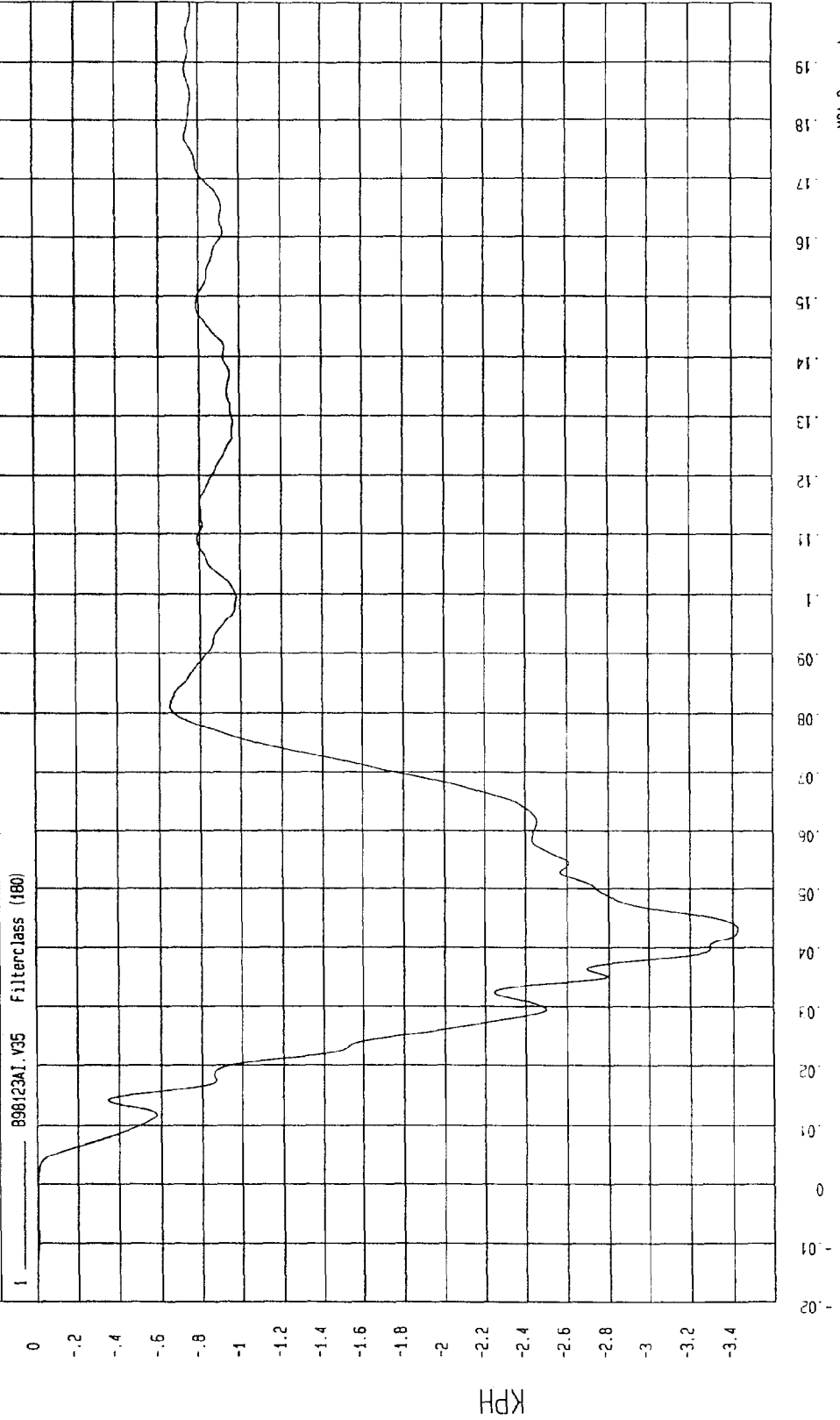
Speed: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

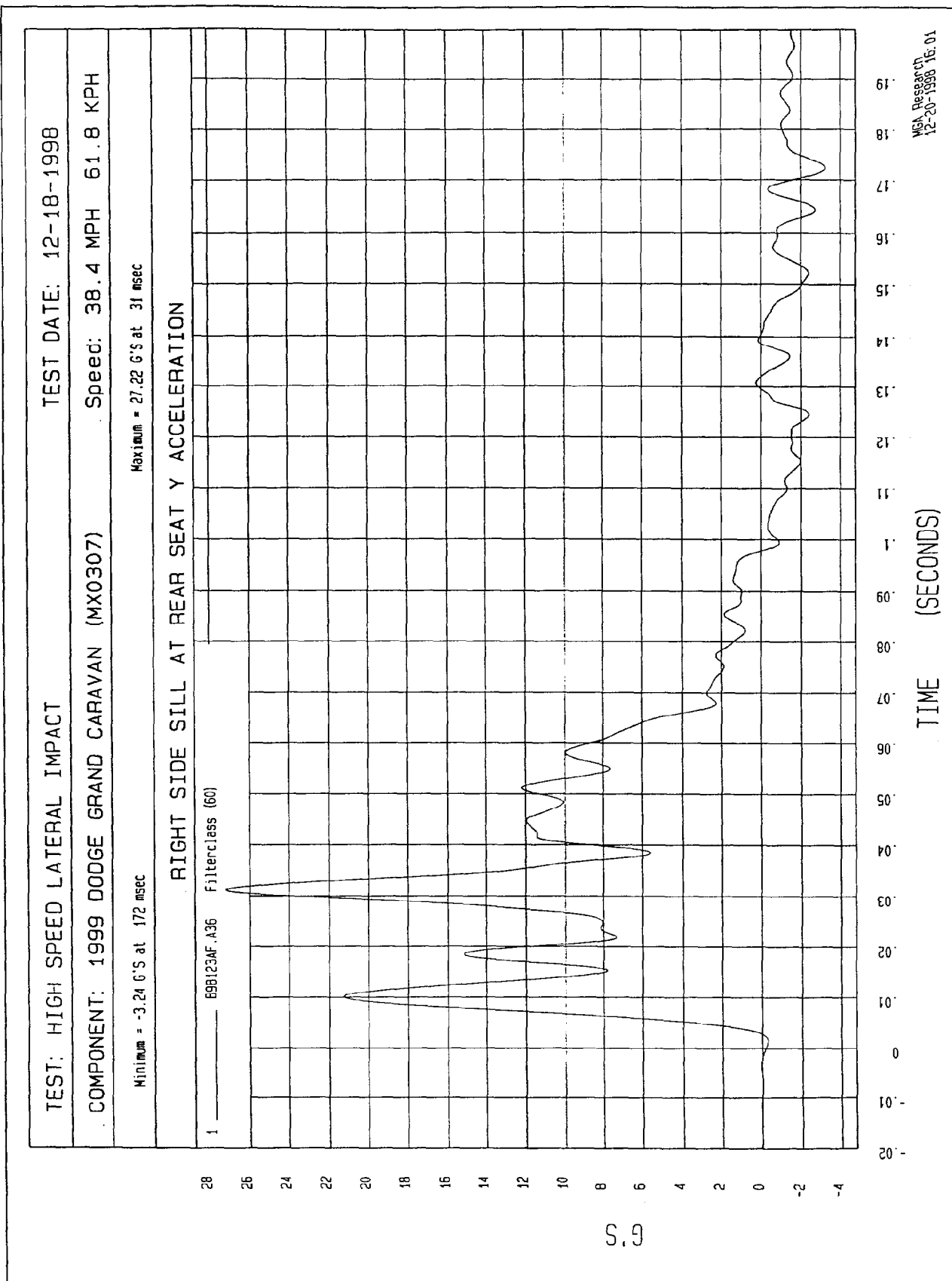
Maximum = 3.67E-03 KPH at -17 msec

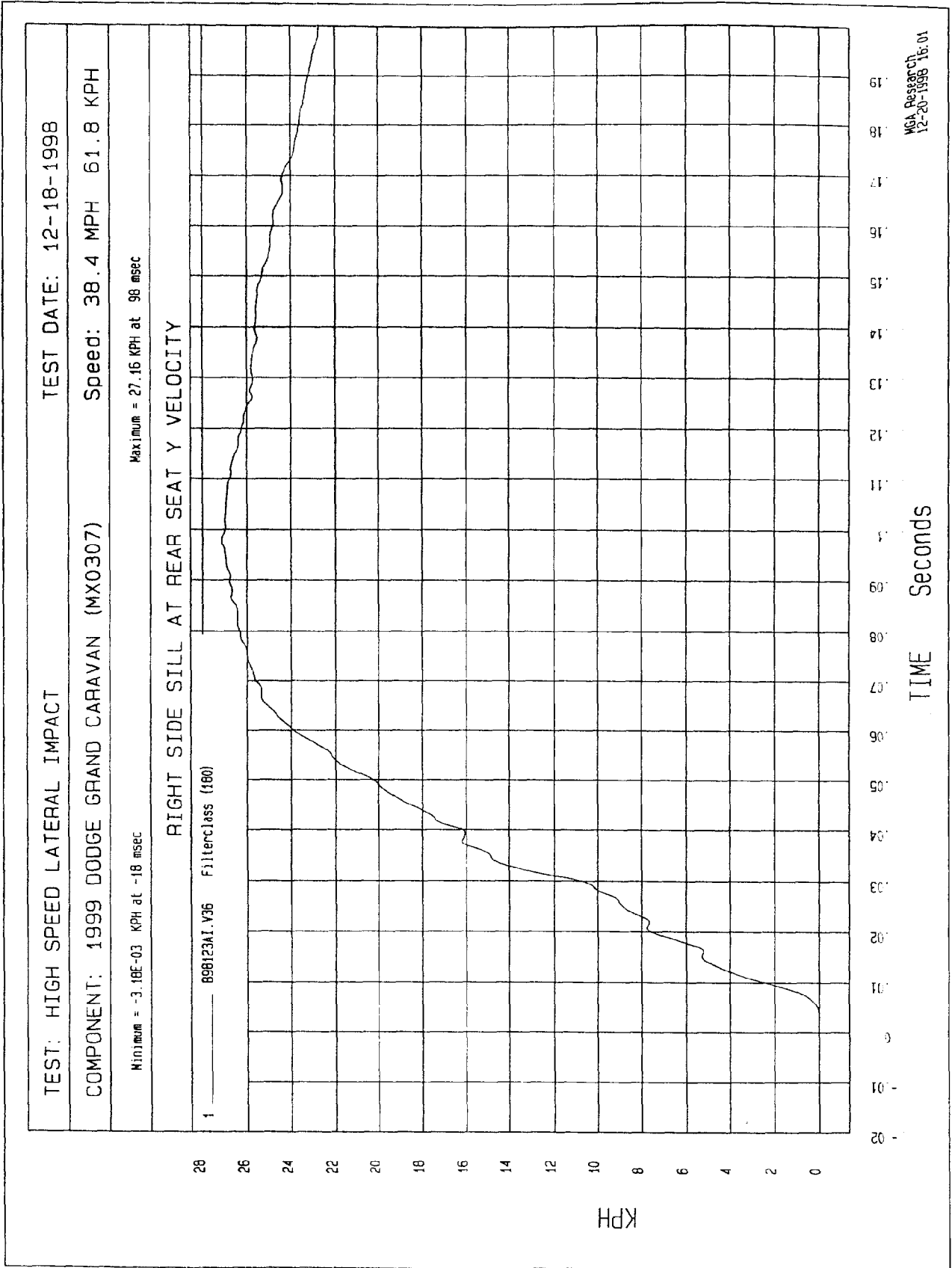
Minimum = -3.42 KPH at 43 msec

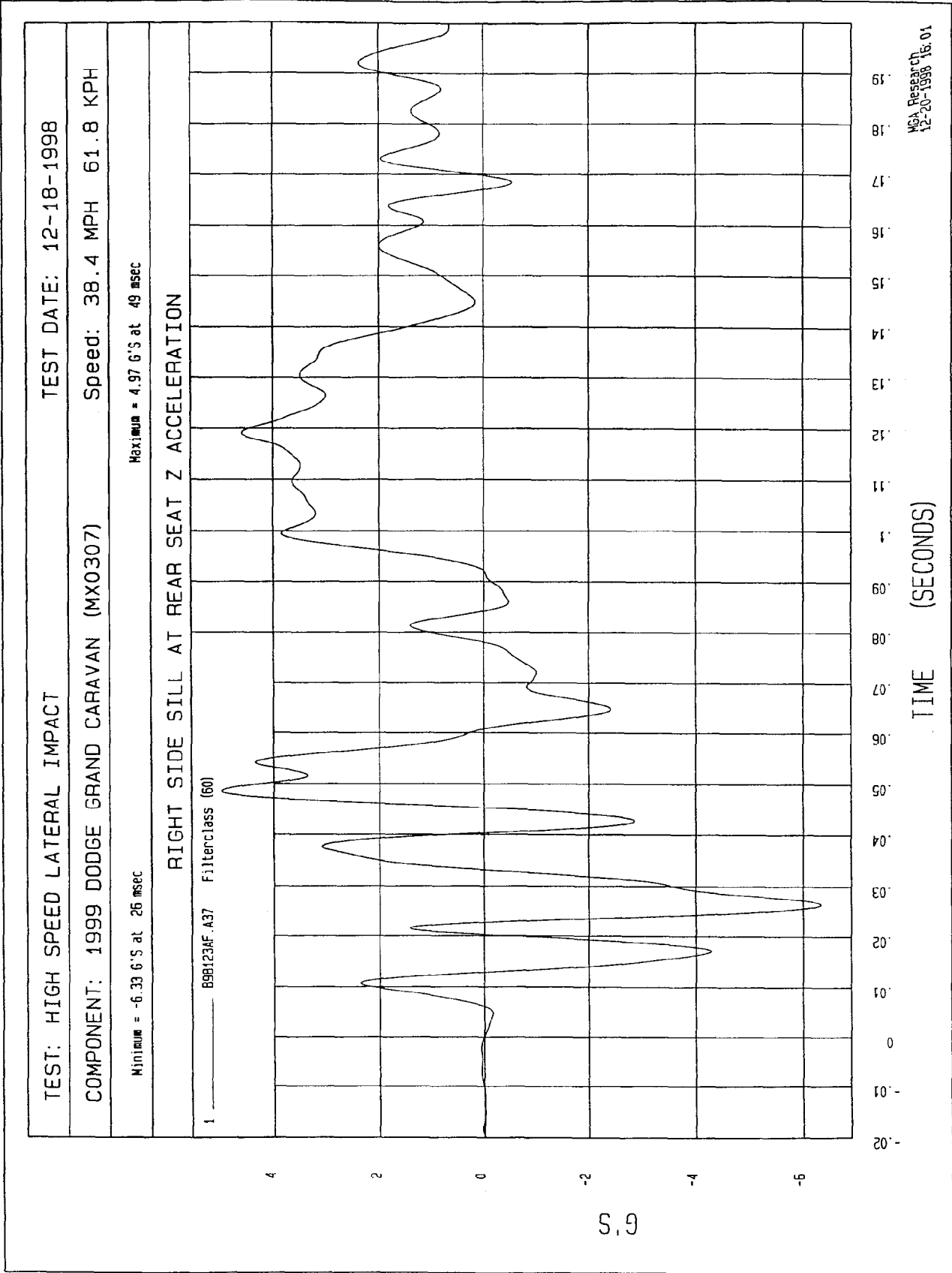
RIGHT SIDE SILL AT REAR SEAT X VELOCITY



MGA Research
12-20-1998 16:01







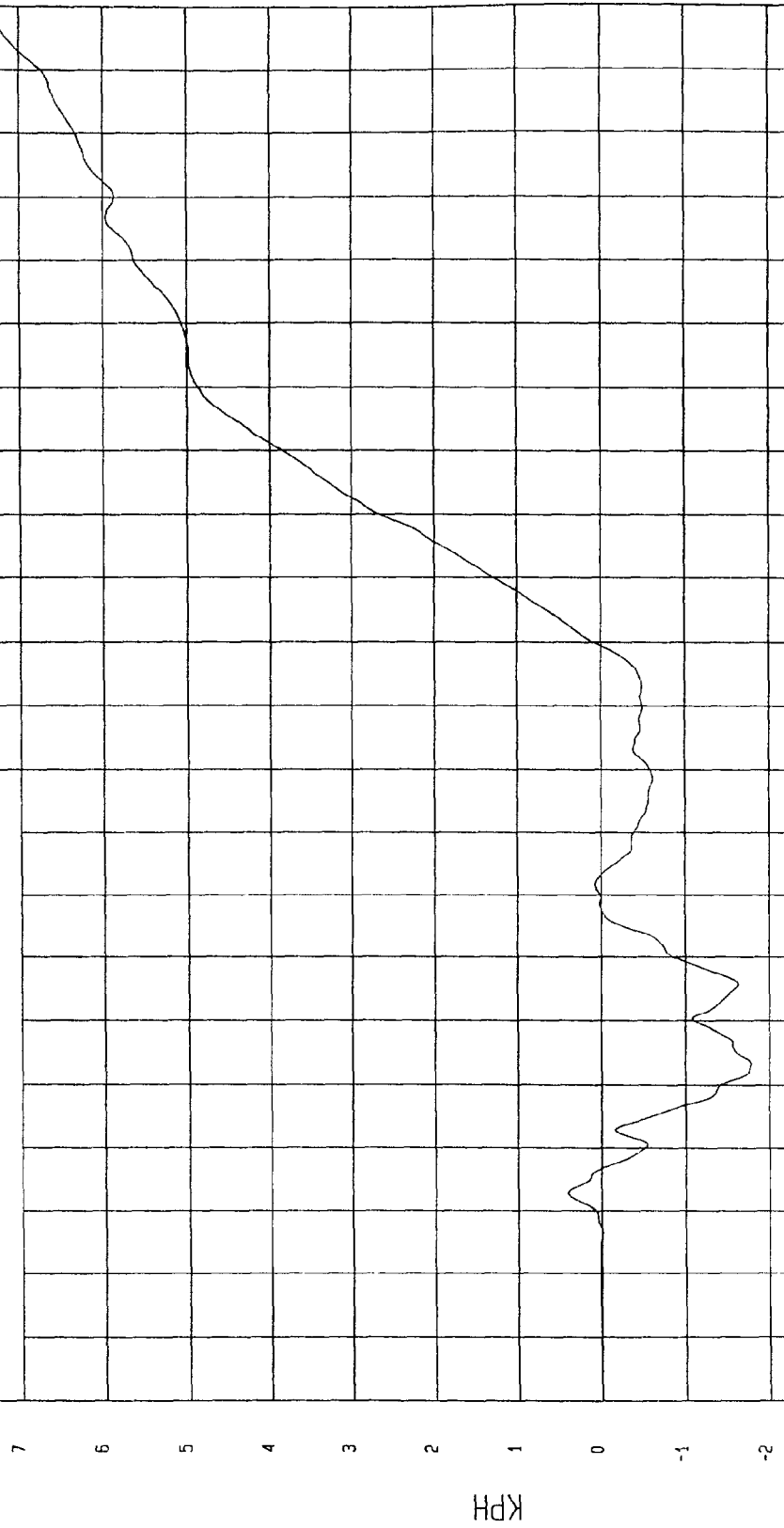
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

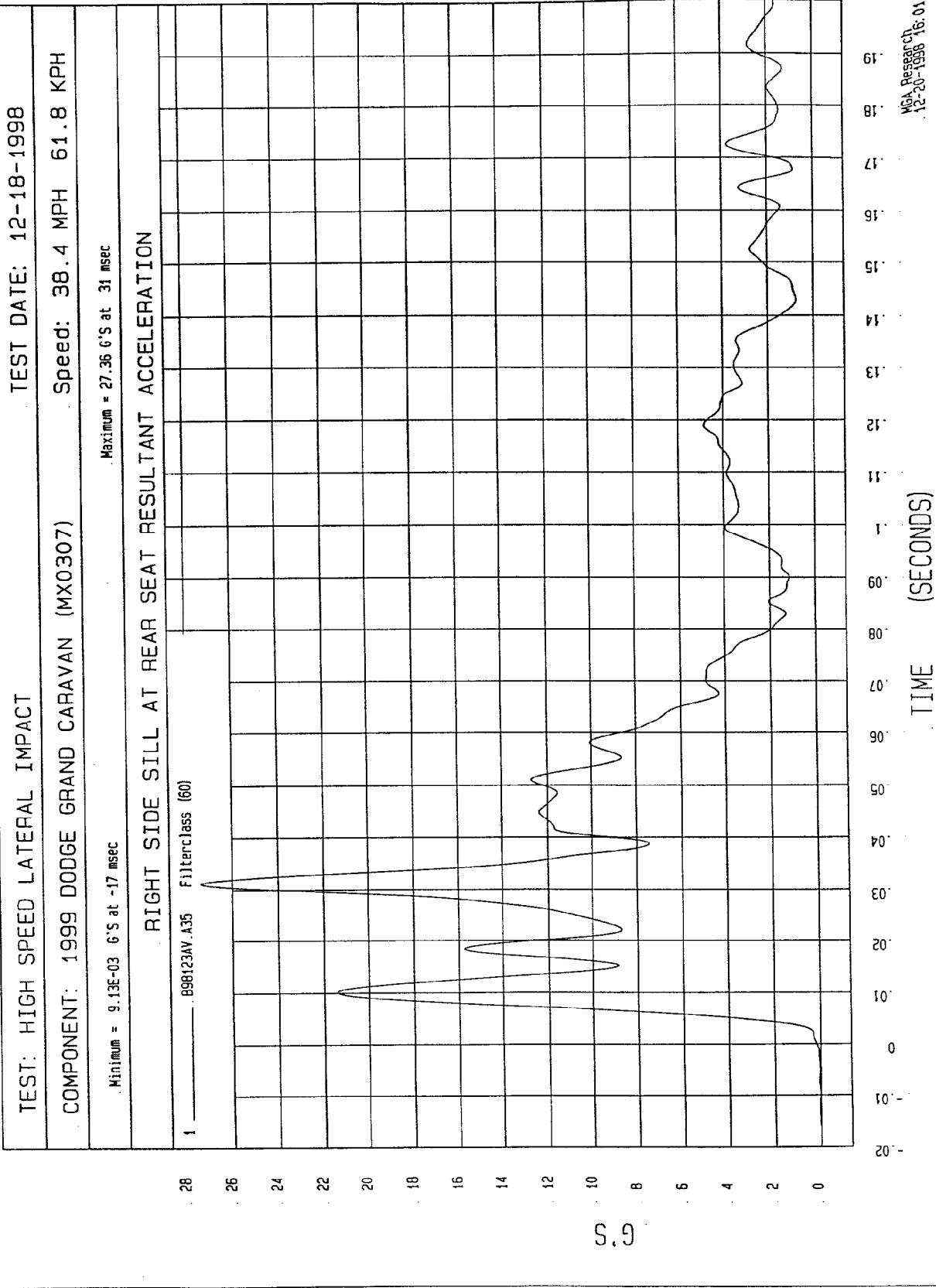
Minimum = -1.78 KPH at 33 msec Maximum = 7.28 KPH at 200 msec

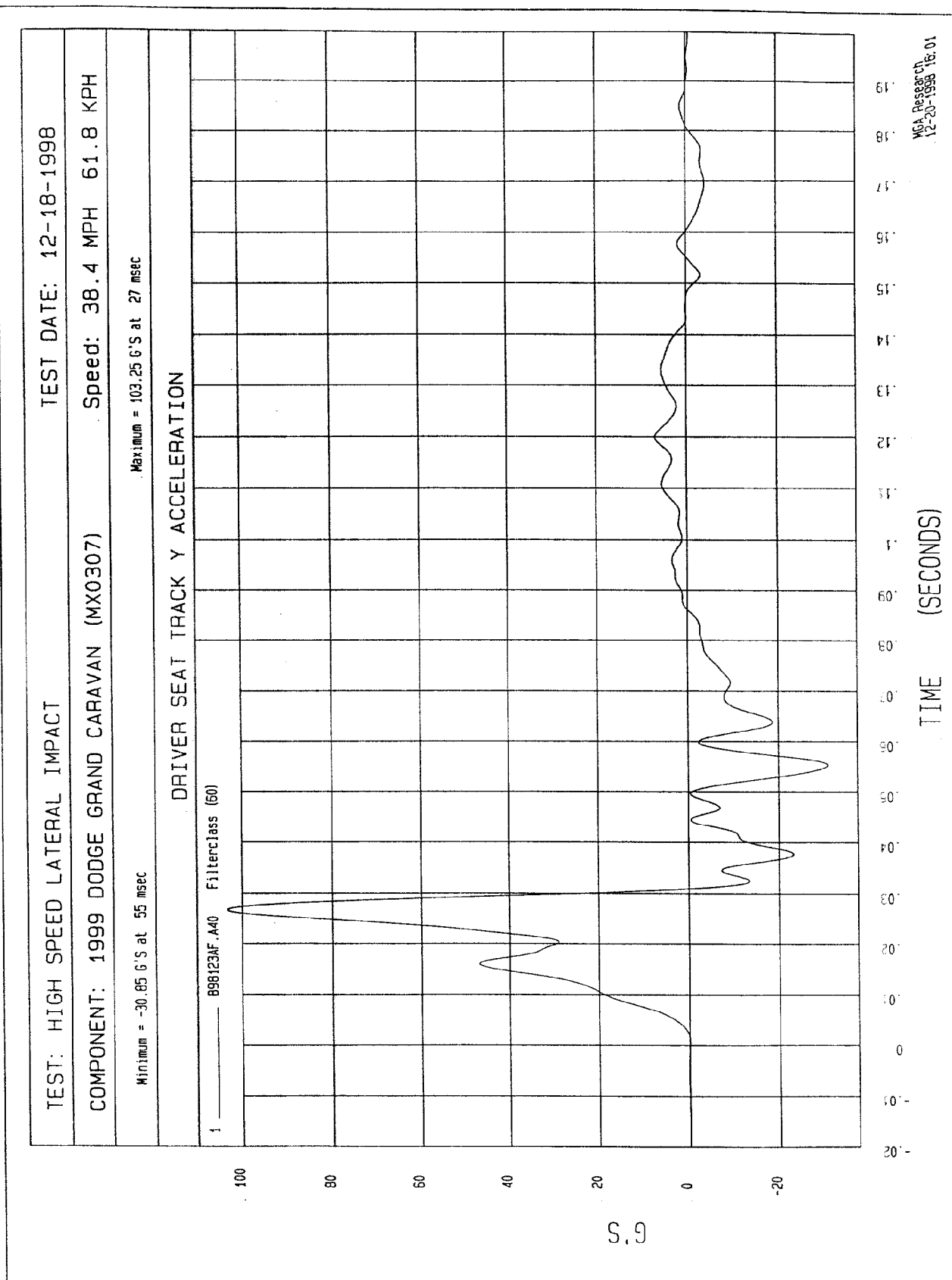
RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

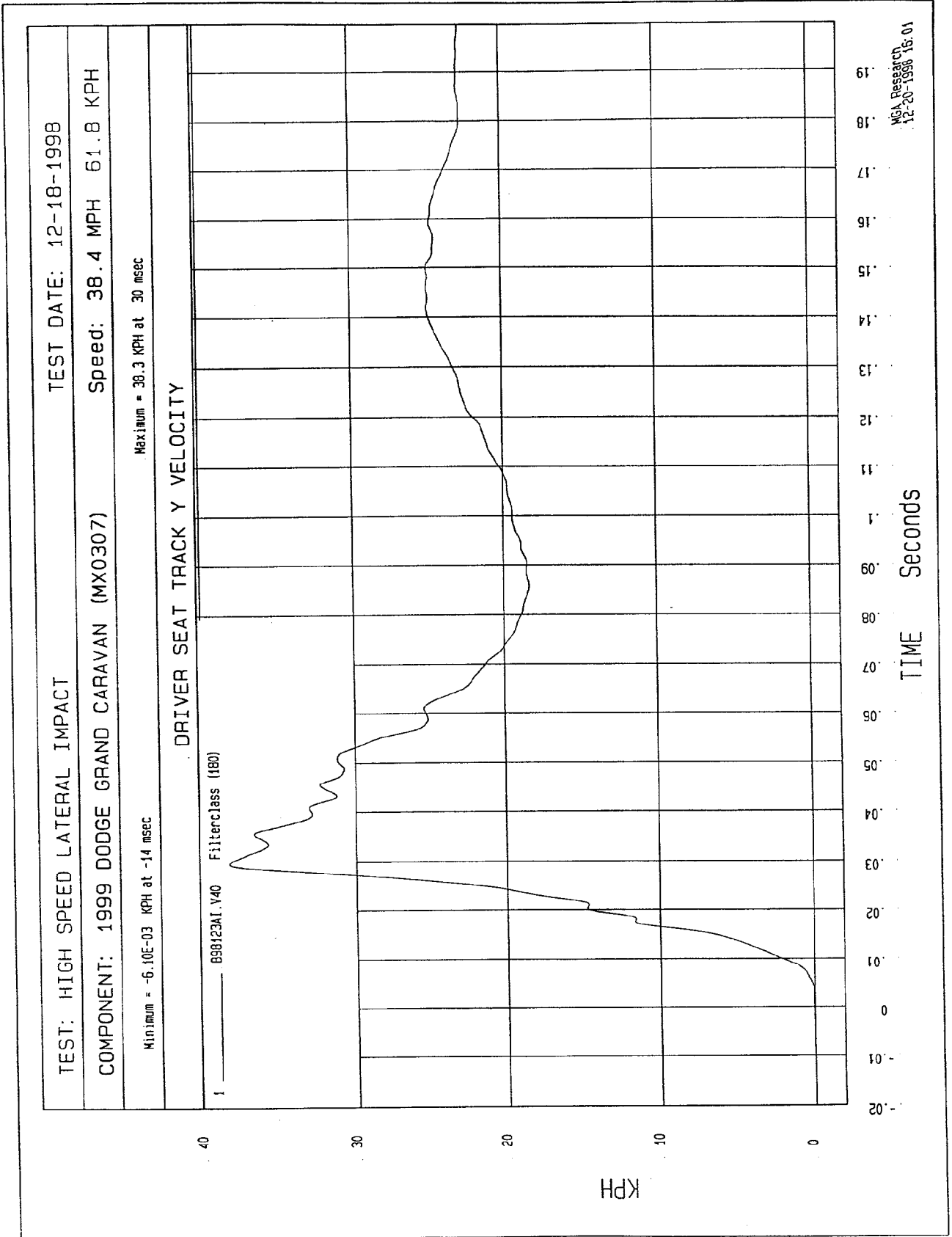
1 _____ B98123A1.V37 Filterclass (180)



TIME Seconds
MOA Research
12-20-1998 16:01





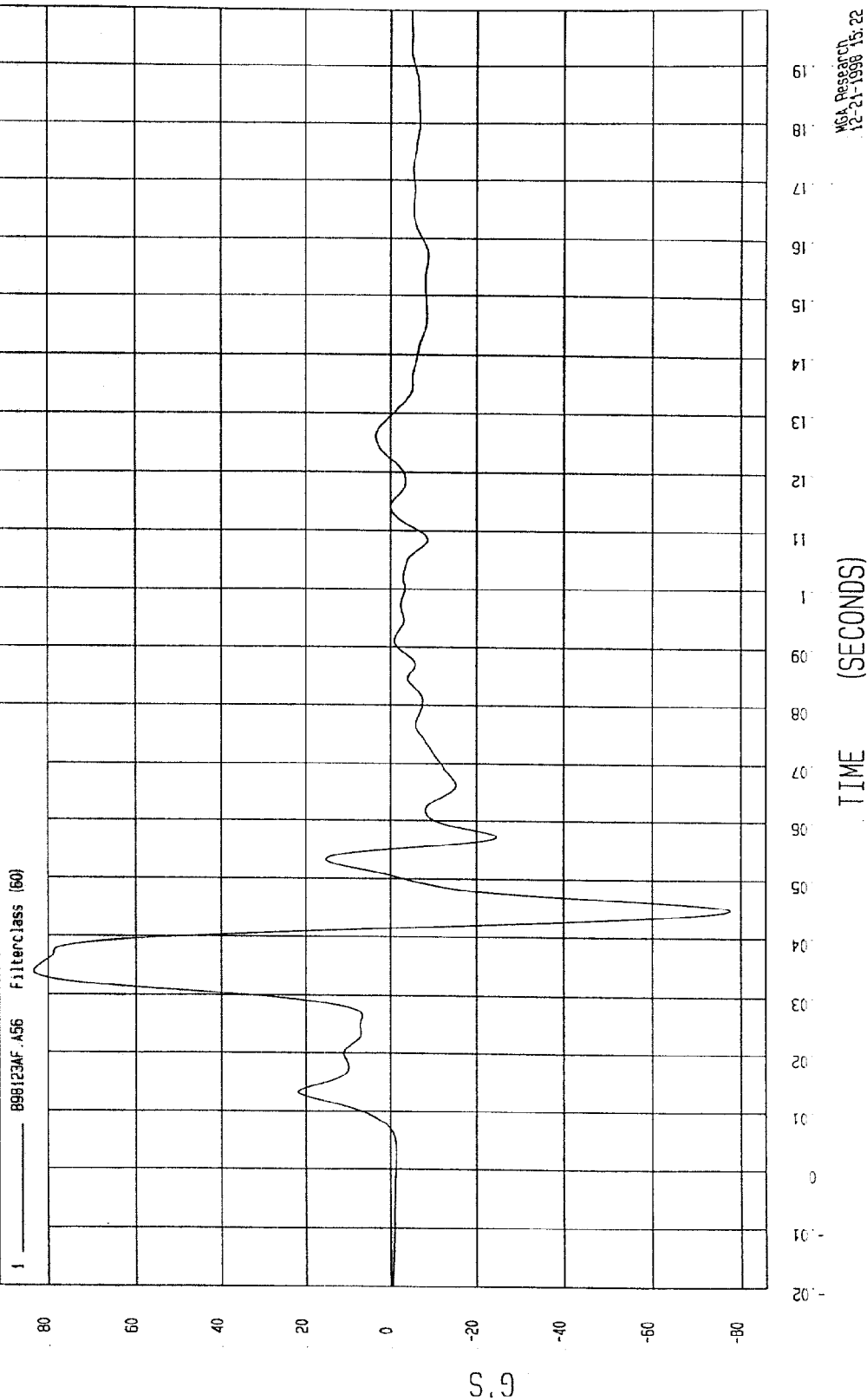


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

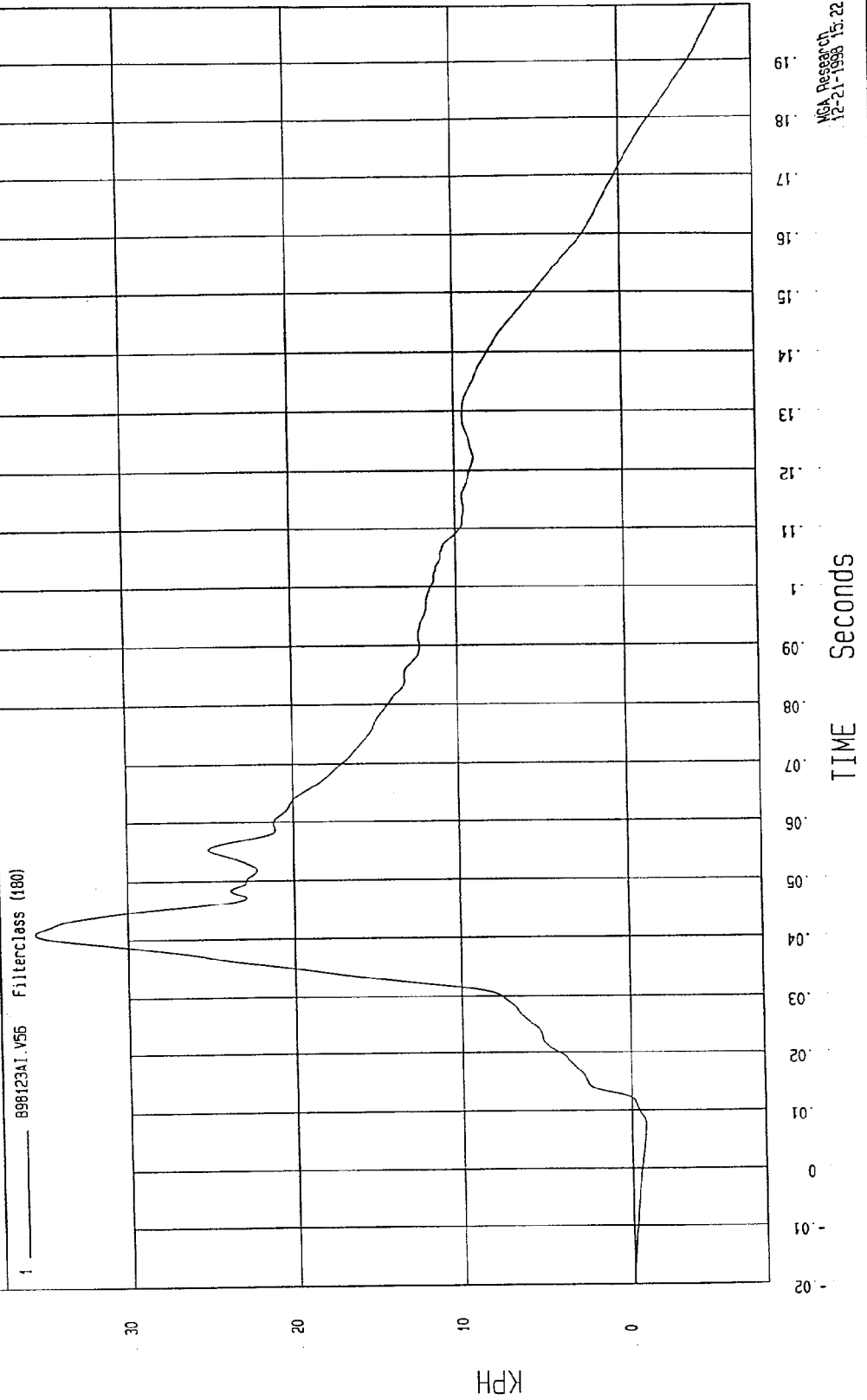
Minimum = -77.51 G'S at 45 msec Maximum = 83.31 G'S at 34 msec

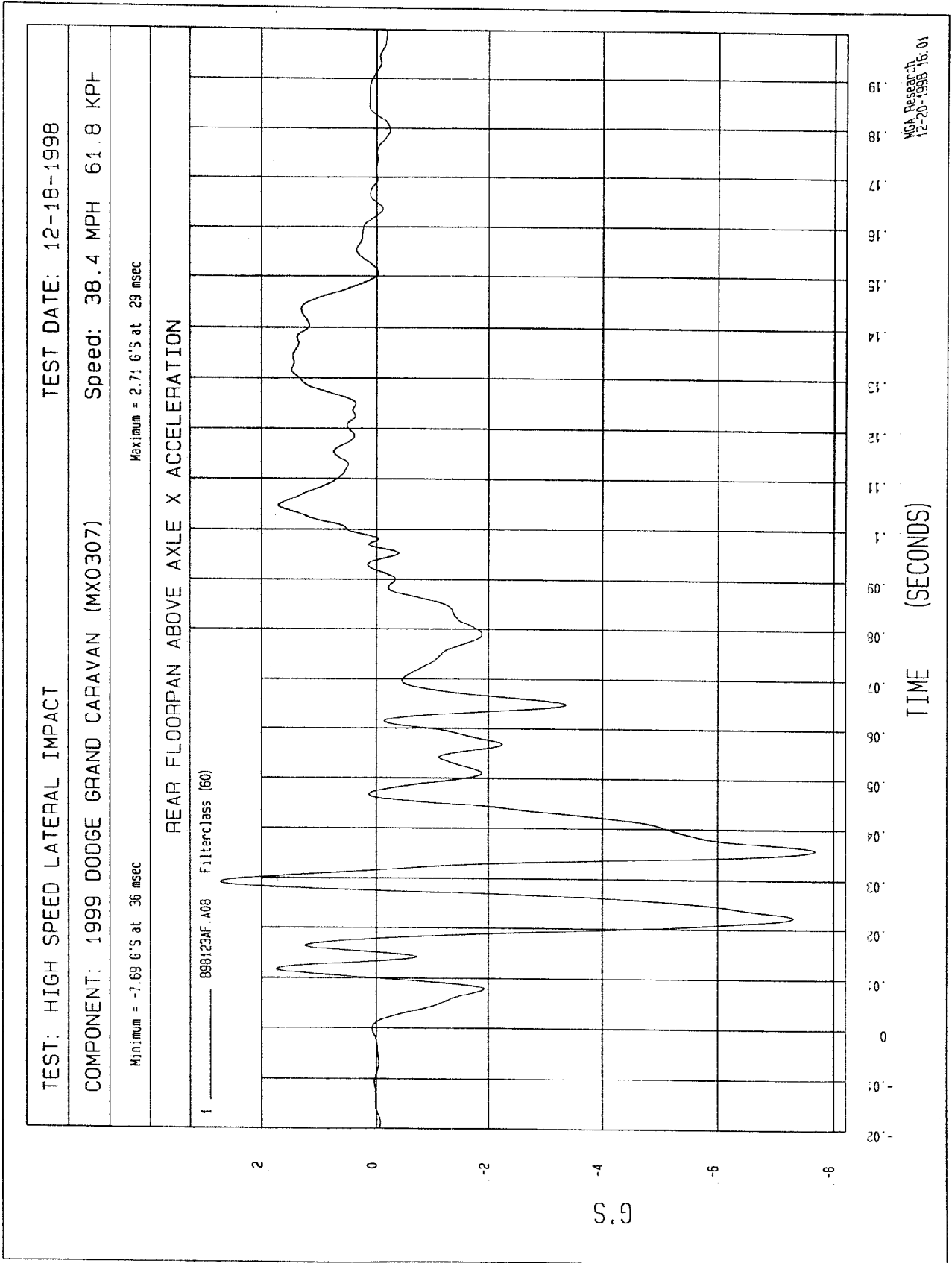
REAR SEAT TRACK Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT
TEST DATE: 12-18-1998
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)
Speed: 38.4 MPH 61.8 KPH
Minimum = -5.72 KPH at 200 msec
Maximum = 35.54 KPH at 41 msec

REAR SEAT TRACK Y VELOCITY



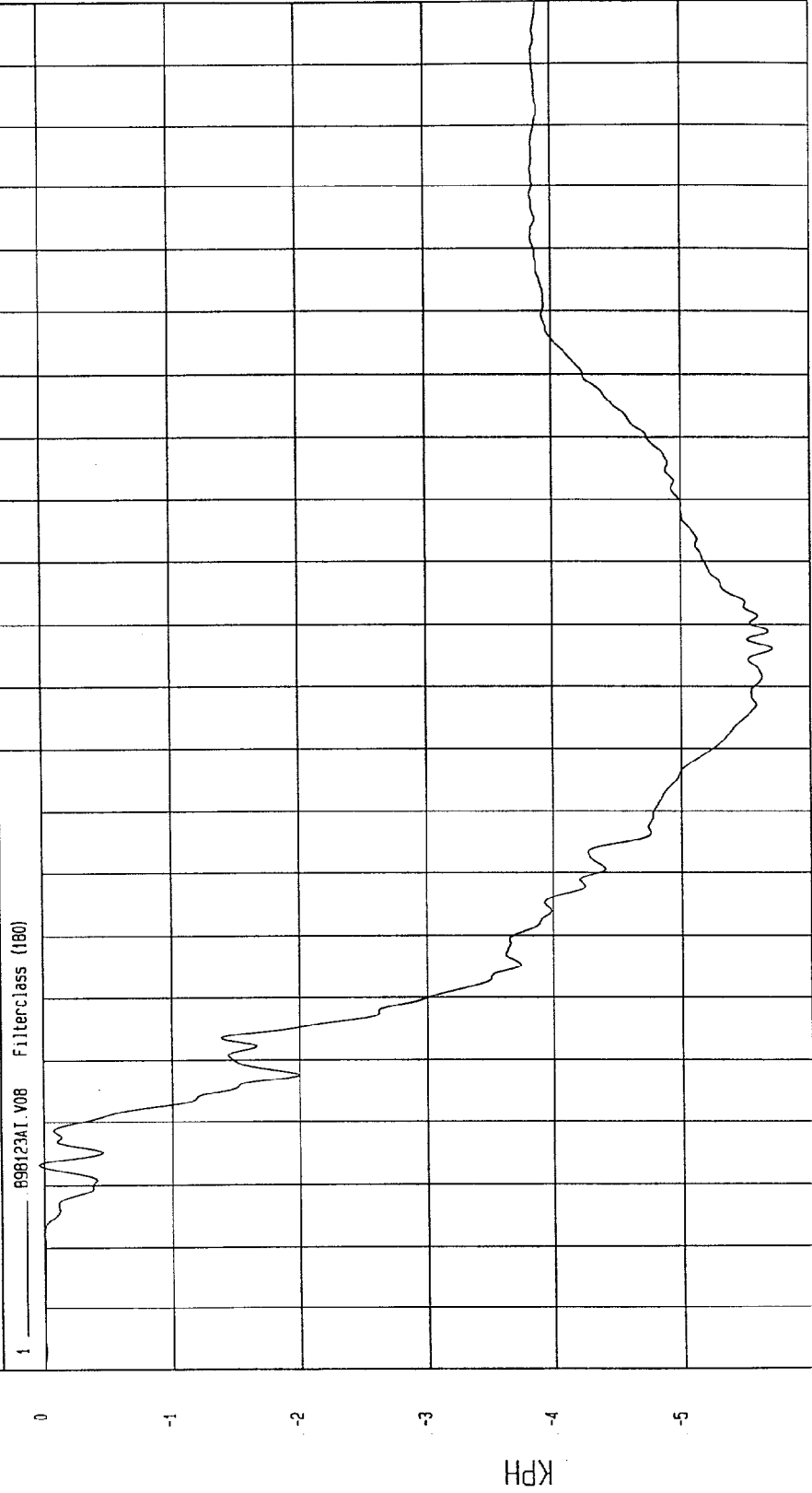


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -5.71 KPH at 96 msec Maximum = 3.84E-02 KPH at 13 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY



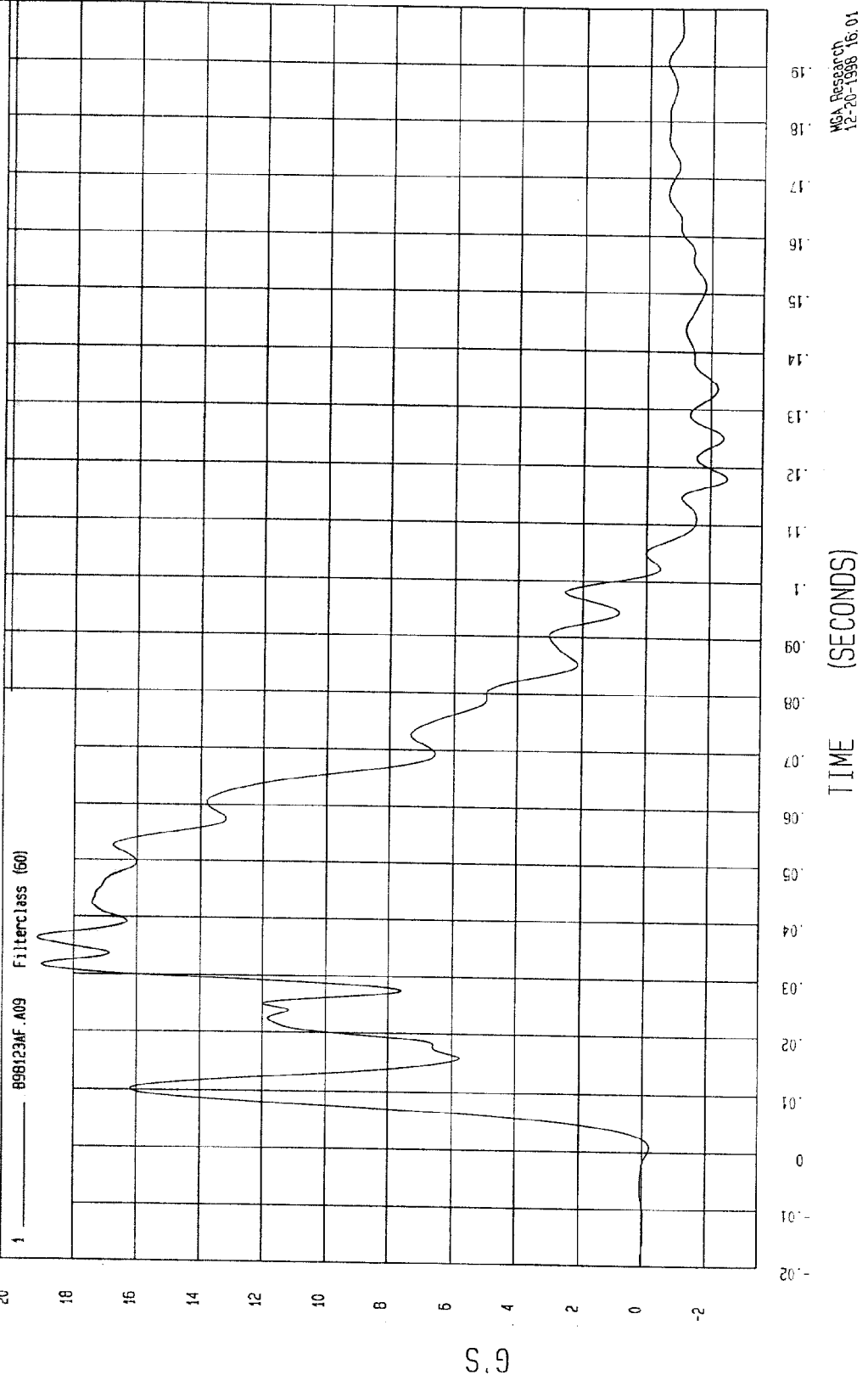
MCA Research
12-20-1998 16:01

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -2.53 G'S at 118 msec Maximum = 19.15 G'S at 36 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

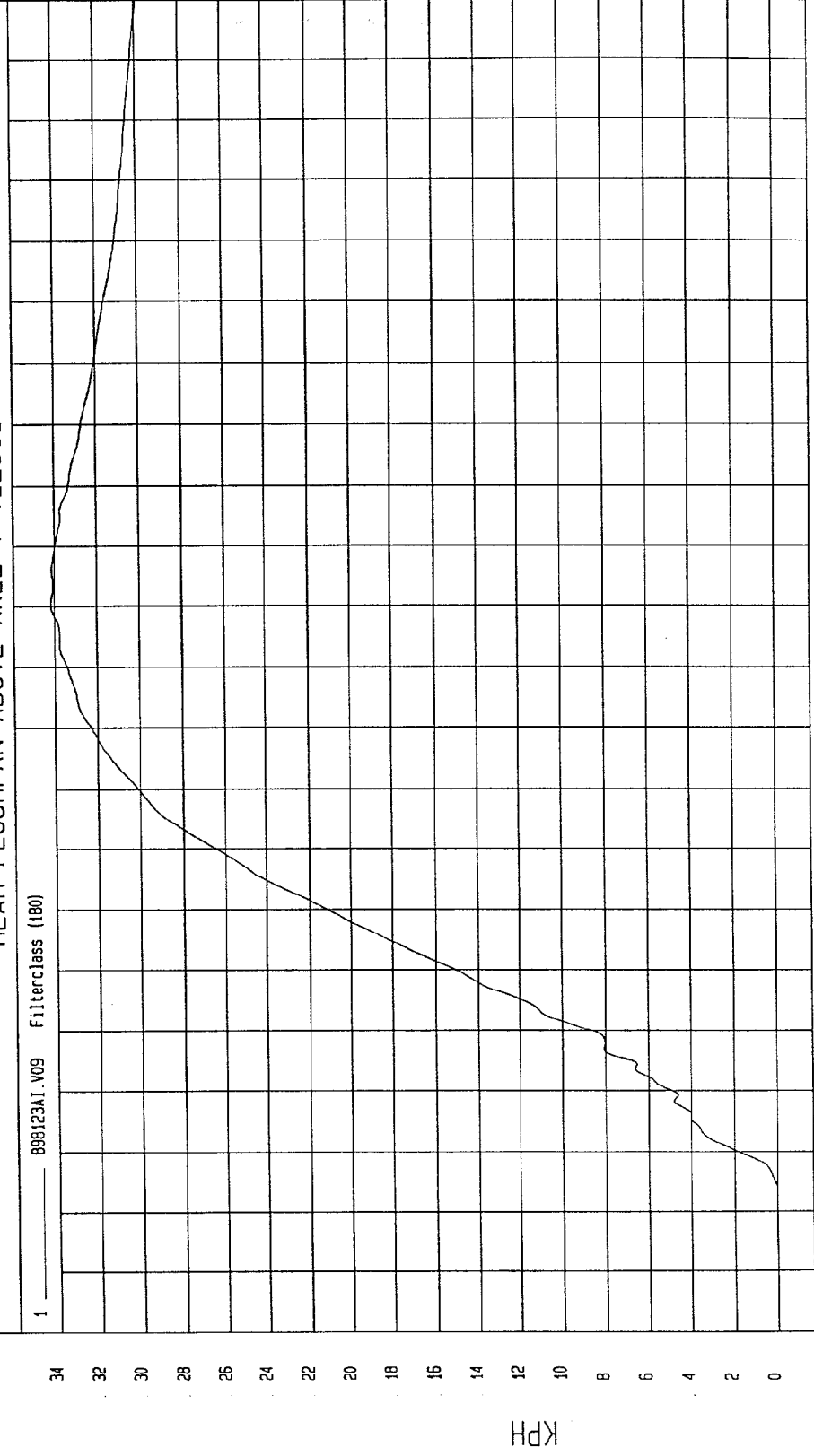


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -1.97E-03 KPH at -9 msec Maximum = 34.18 KPH at 100 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY



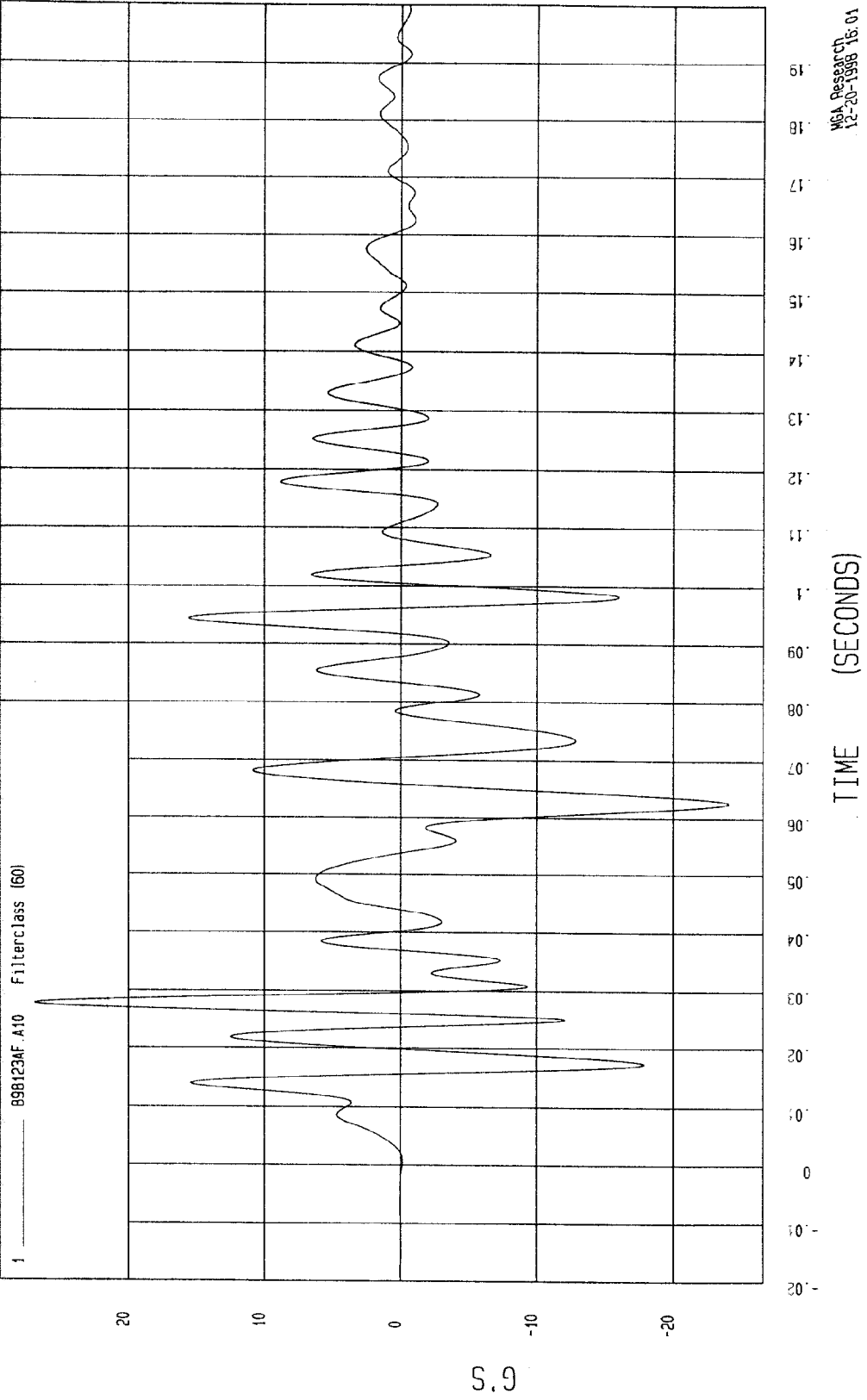
W&A Research
12-20-1998 16.01

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -24.01 G'S at 63 msec Maximum = 26.82 G'S at 28 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION

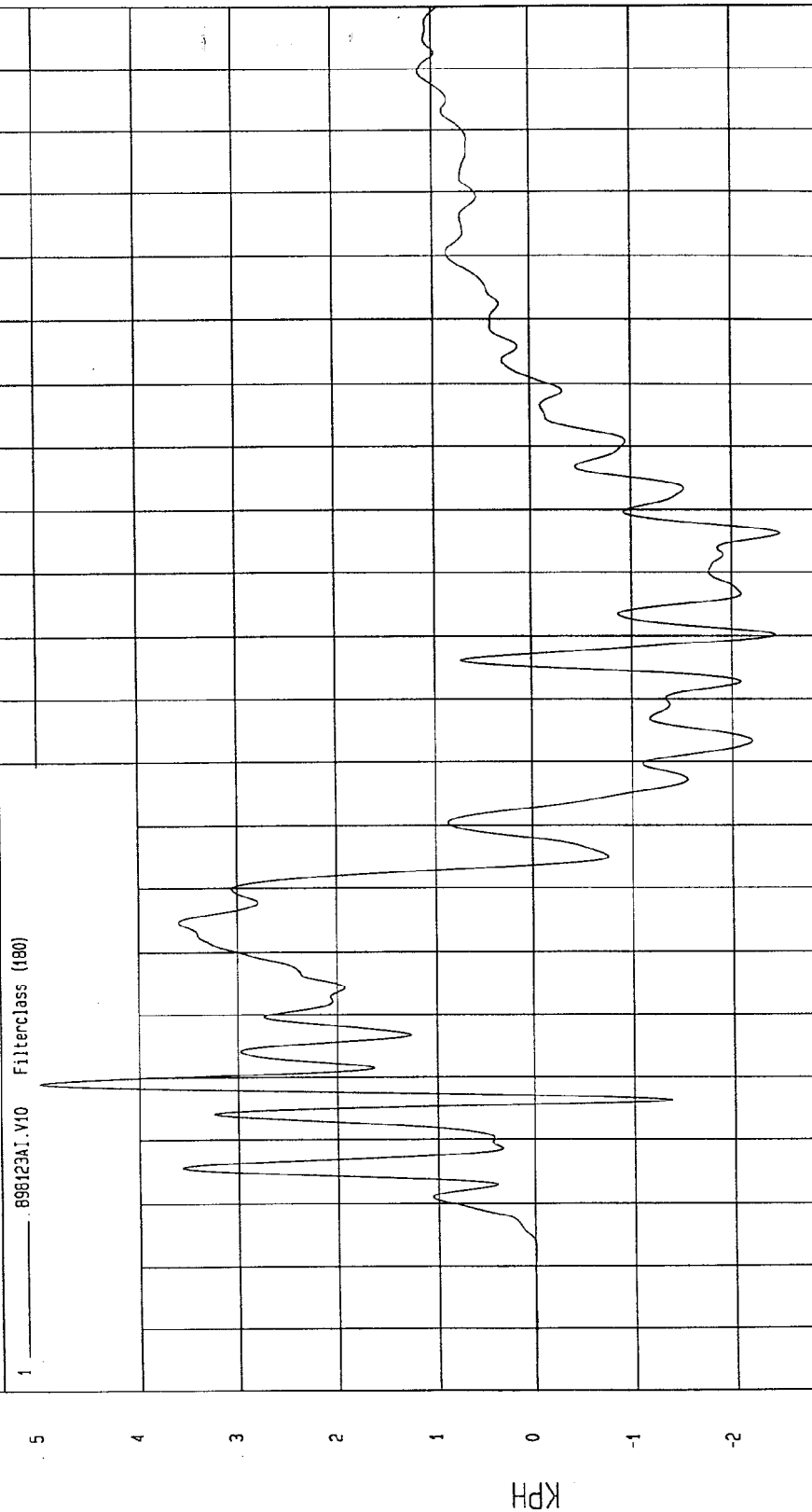


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

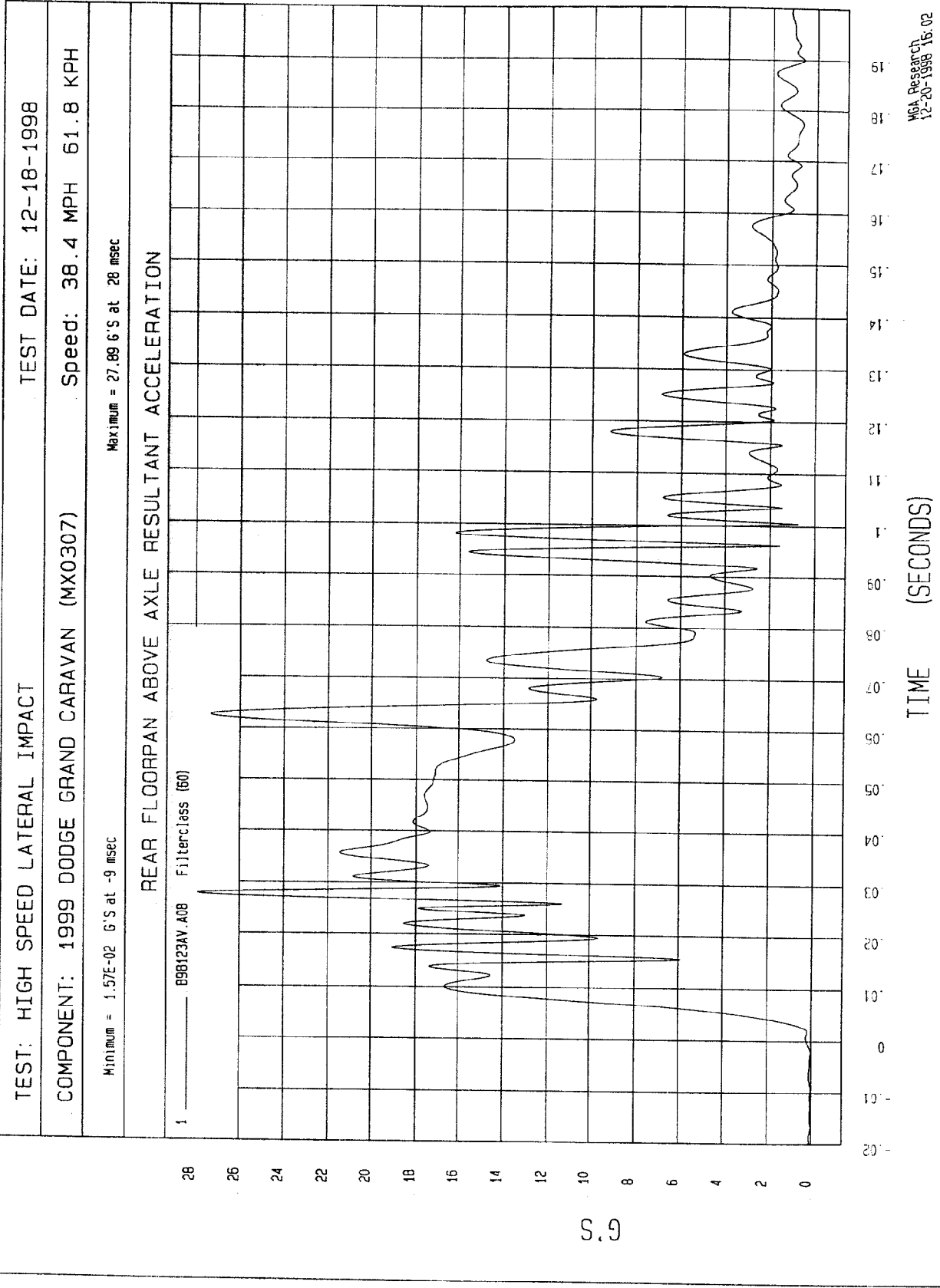
Minimum = -2.49 KPH at 116 msec Maximum = 5 KPH at 29 msec

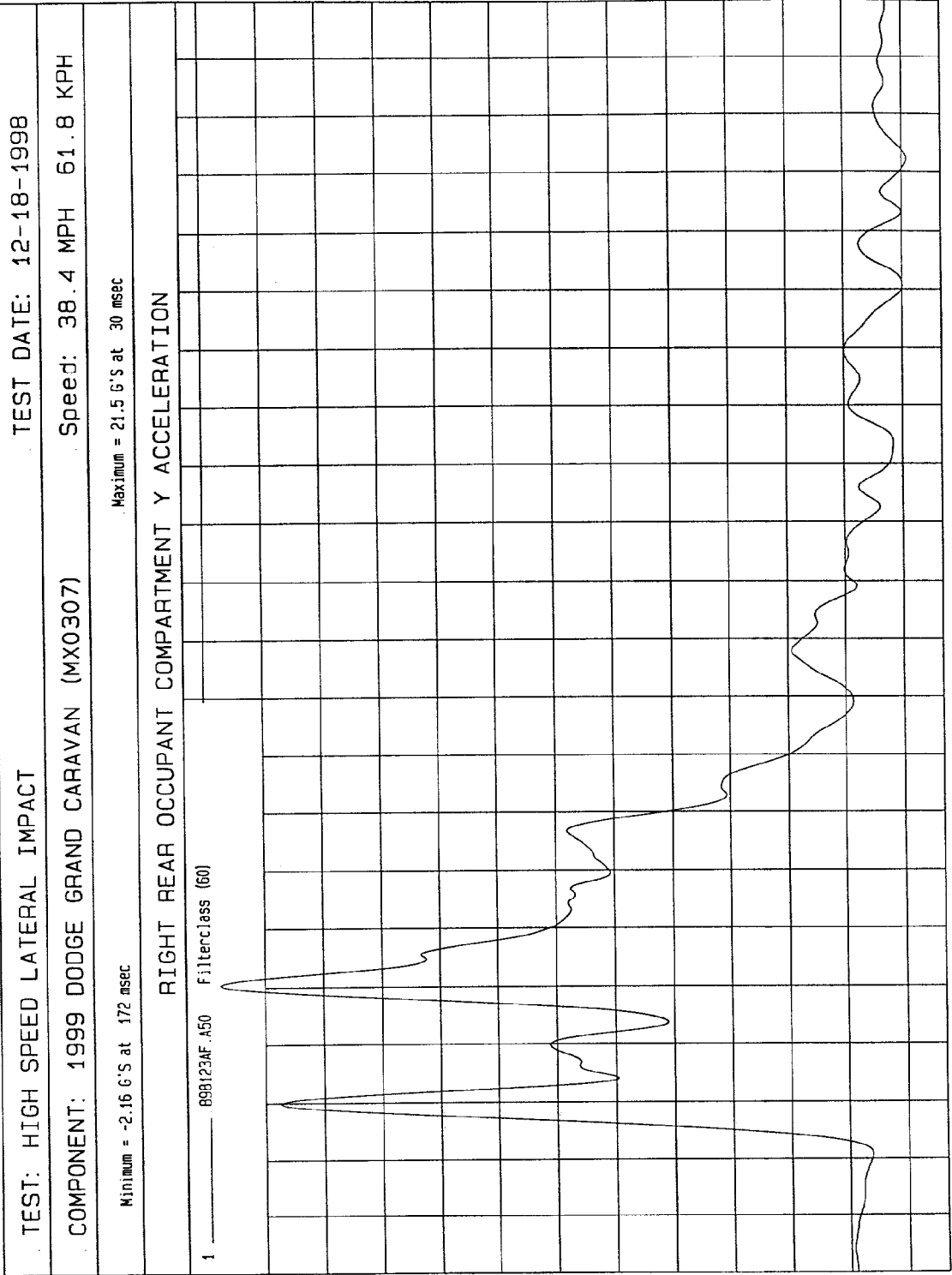
REAR FLOORPAN ABOVE AXLE Z VELOCITY



TIME Seconds

MCA Research
12-20-1998 16.02





WGA Research
12-20-1998 16:02

TIME (SECONDS)

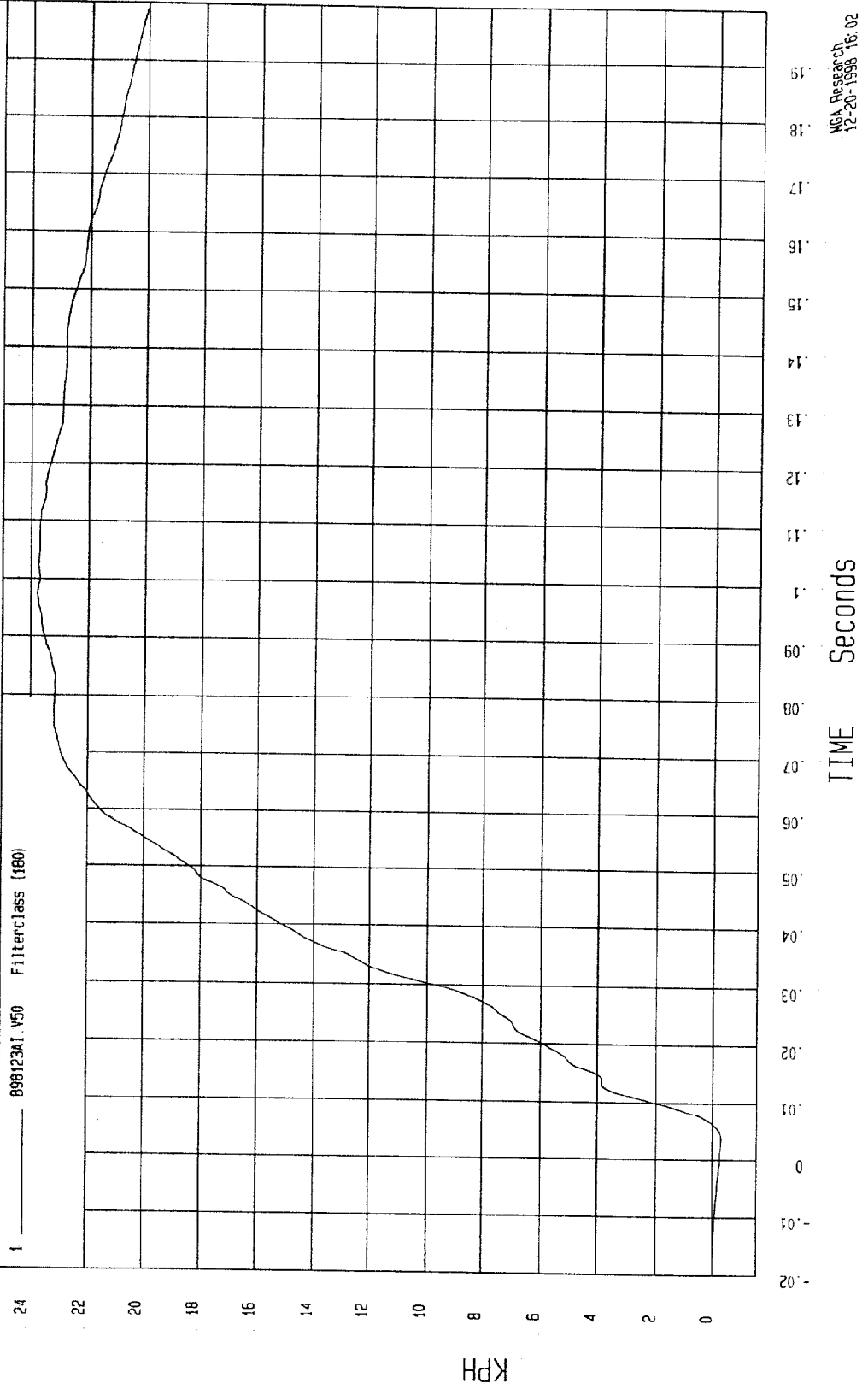
G.S

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -.29 KPH at 4 msec Maximum = 23.77 KPH at 97 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY

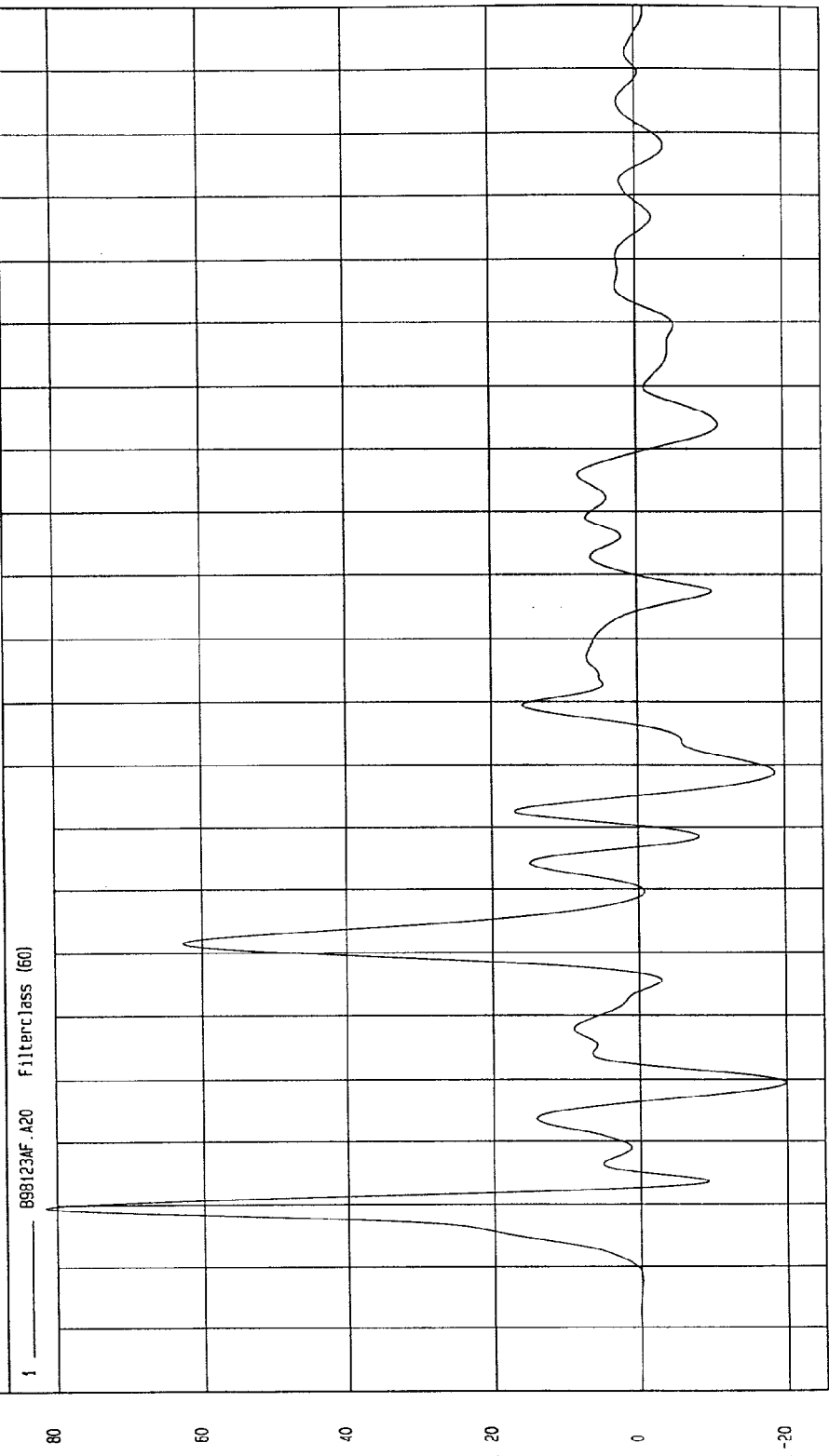


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -19.96 G'S at 30 msec Maximum = 81.52 G'S at 10 msec

LEFT LOWER A-POST Y ACCELERATION



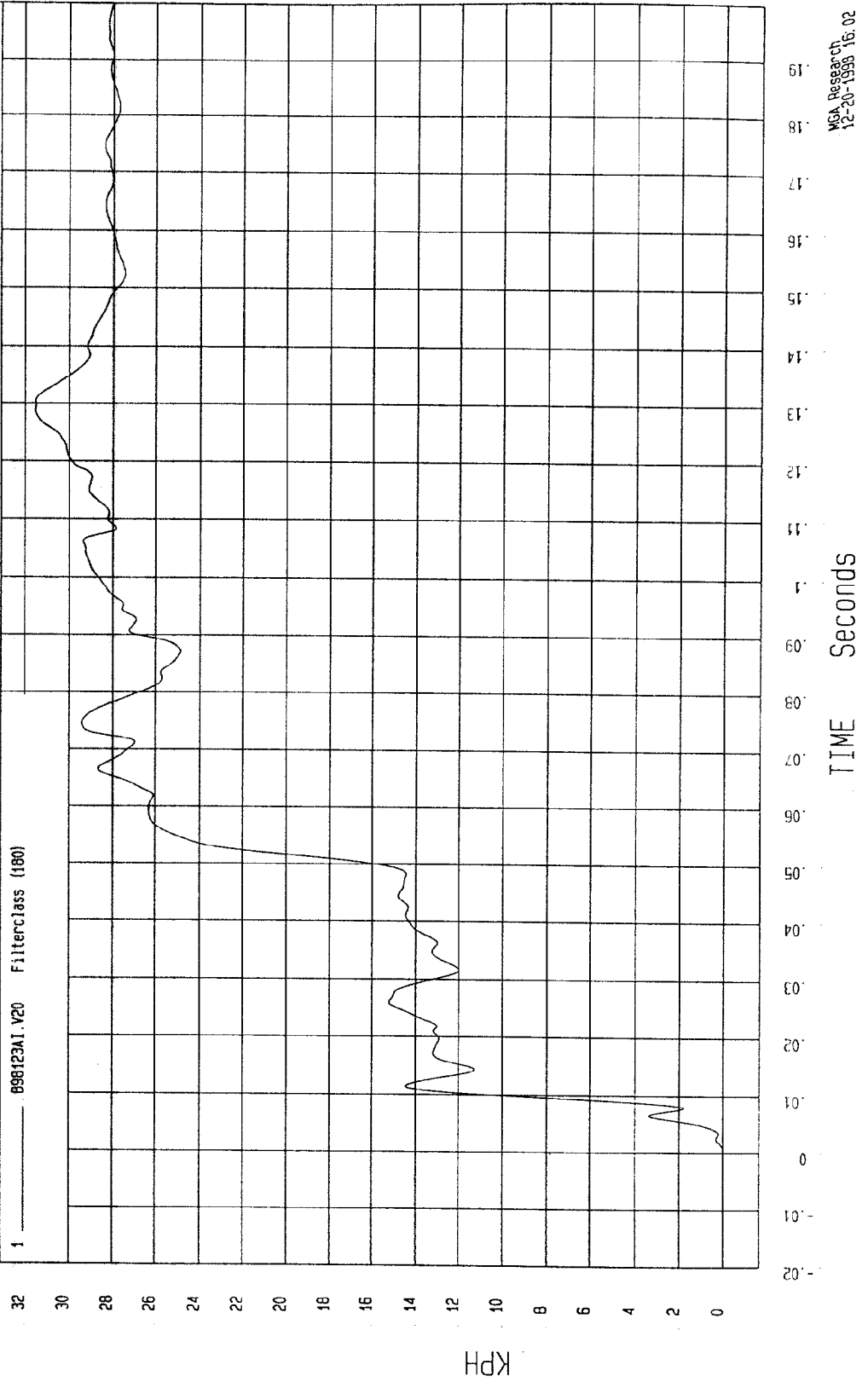
NSA Research
12-20-1998 16.02

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -1.39E-03 KPH at -9 msec
Maximum = 31.52 KPH at 129 msec

LEFT LOWER A-POST Y VELOCITY

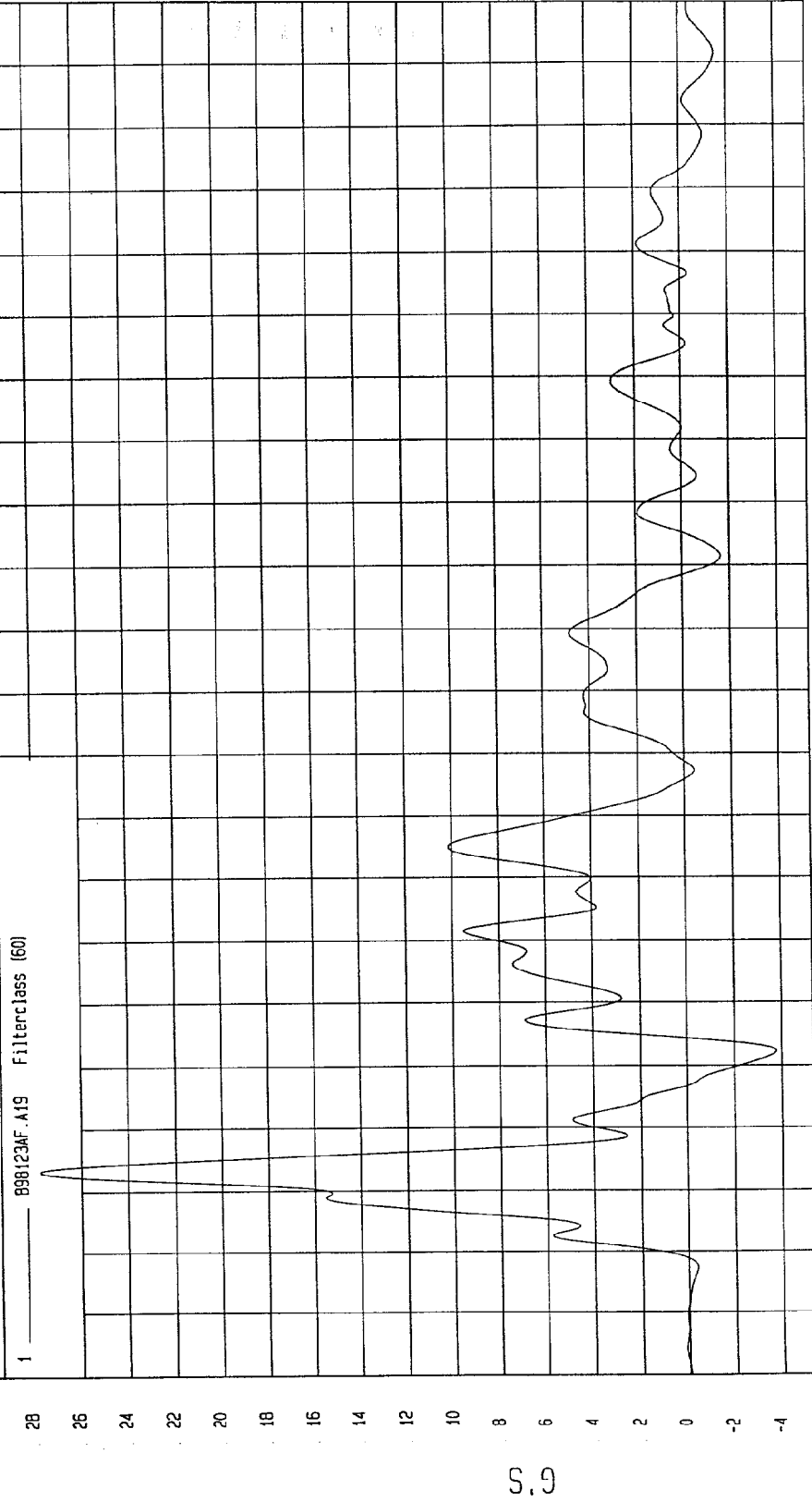


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -3.77 G'S at 32 msec Maximum = 27.78 G'S at 13 msec

LEFT MID A-POST Y ACCELERATION



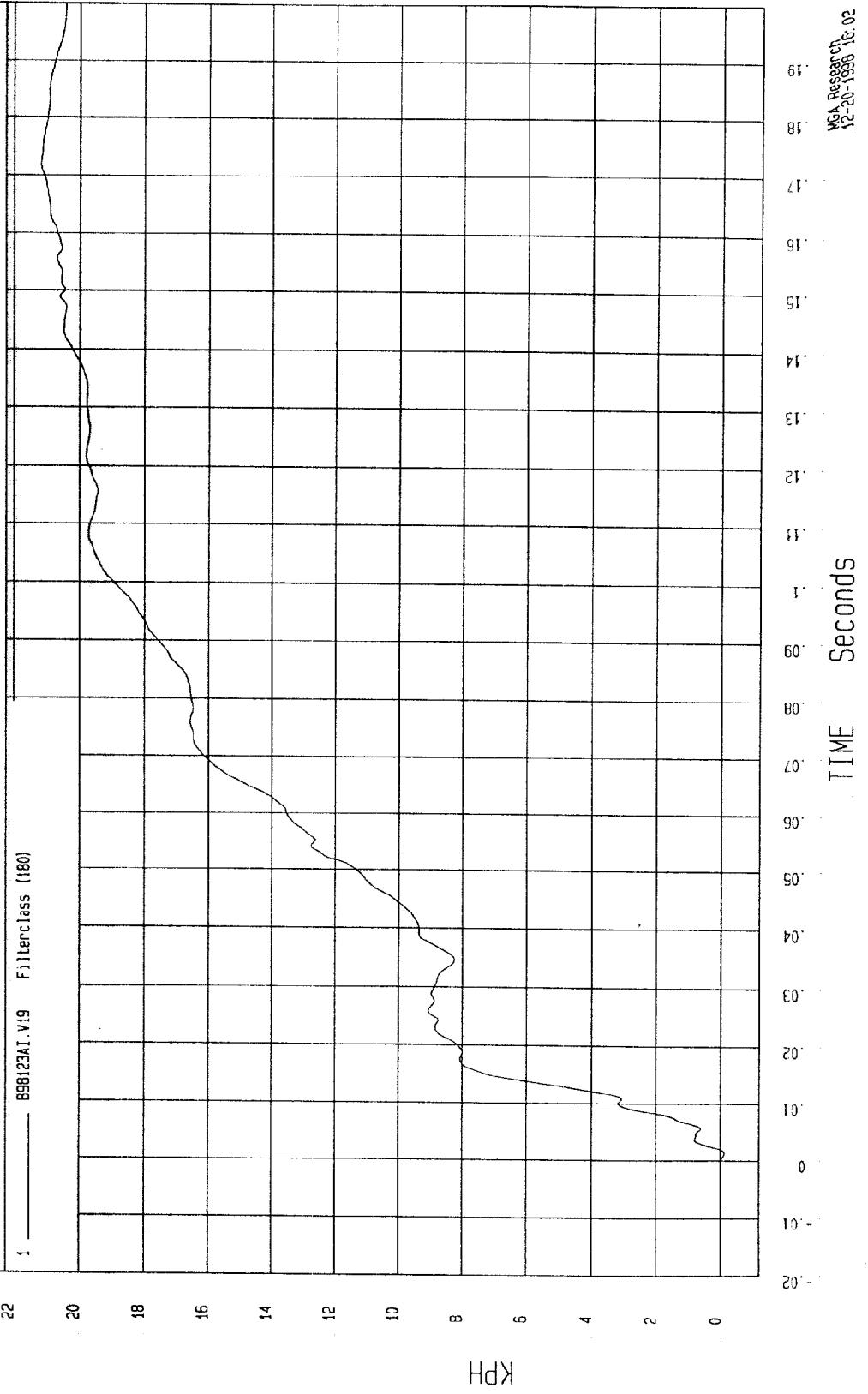
MOA Research
12-20-1998 16.02

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = - 11 KPH at 1 msec Maximum = 21.18 KPH at 172 msec

LEFT MID A-POST Y VELOCITY



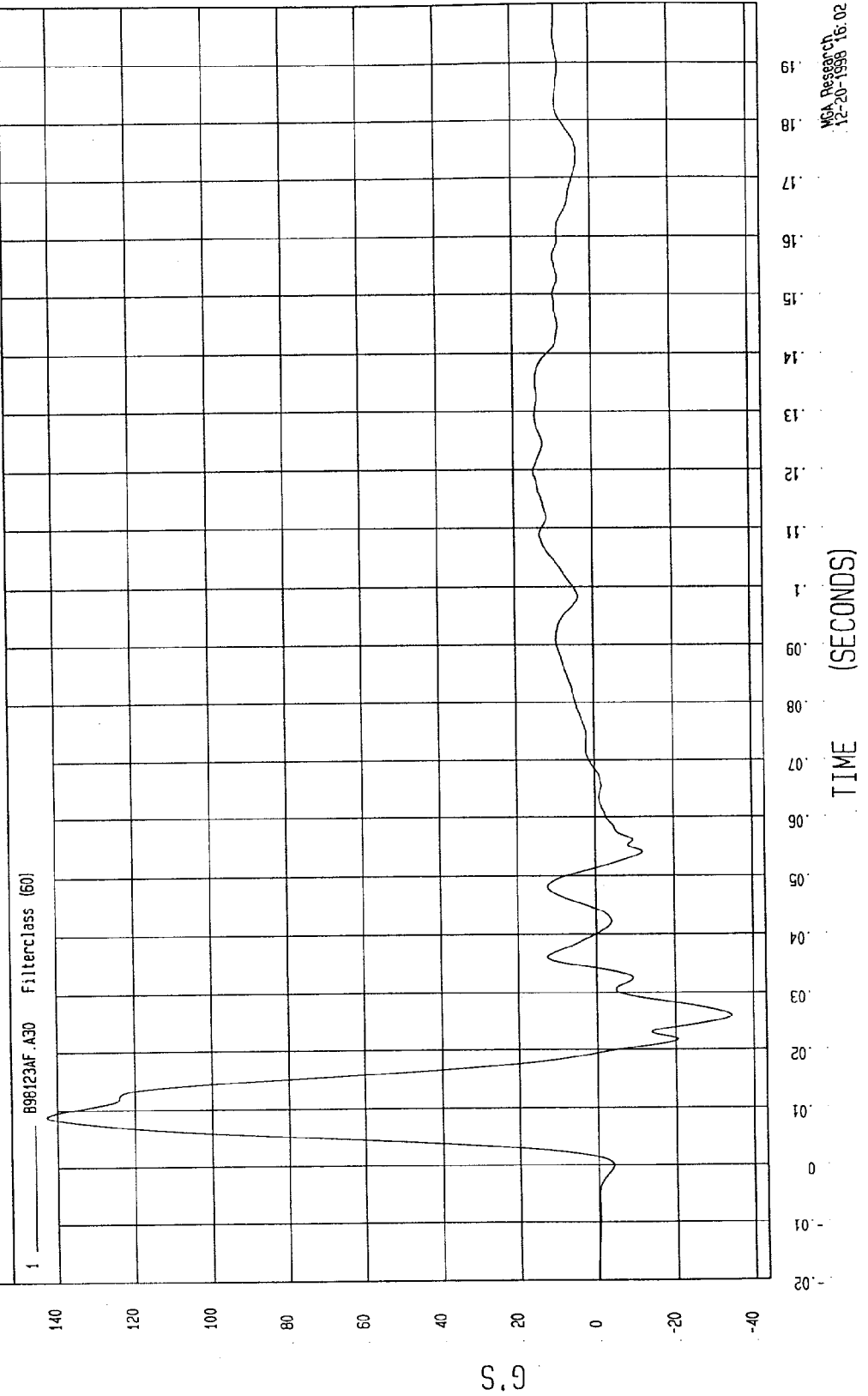
MCA Research
12-20-1998 16:02

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -34.44 G'S at 25 msec Maximum = 142.71 G'S at 9 msec

LEFT LOWER B-POST Y ACCELERATION

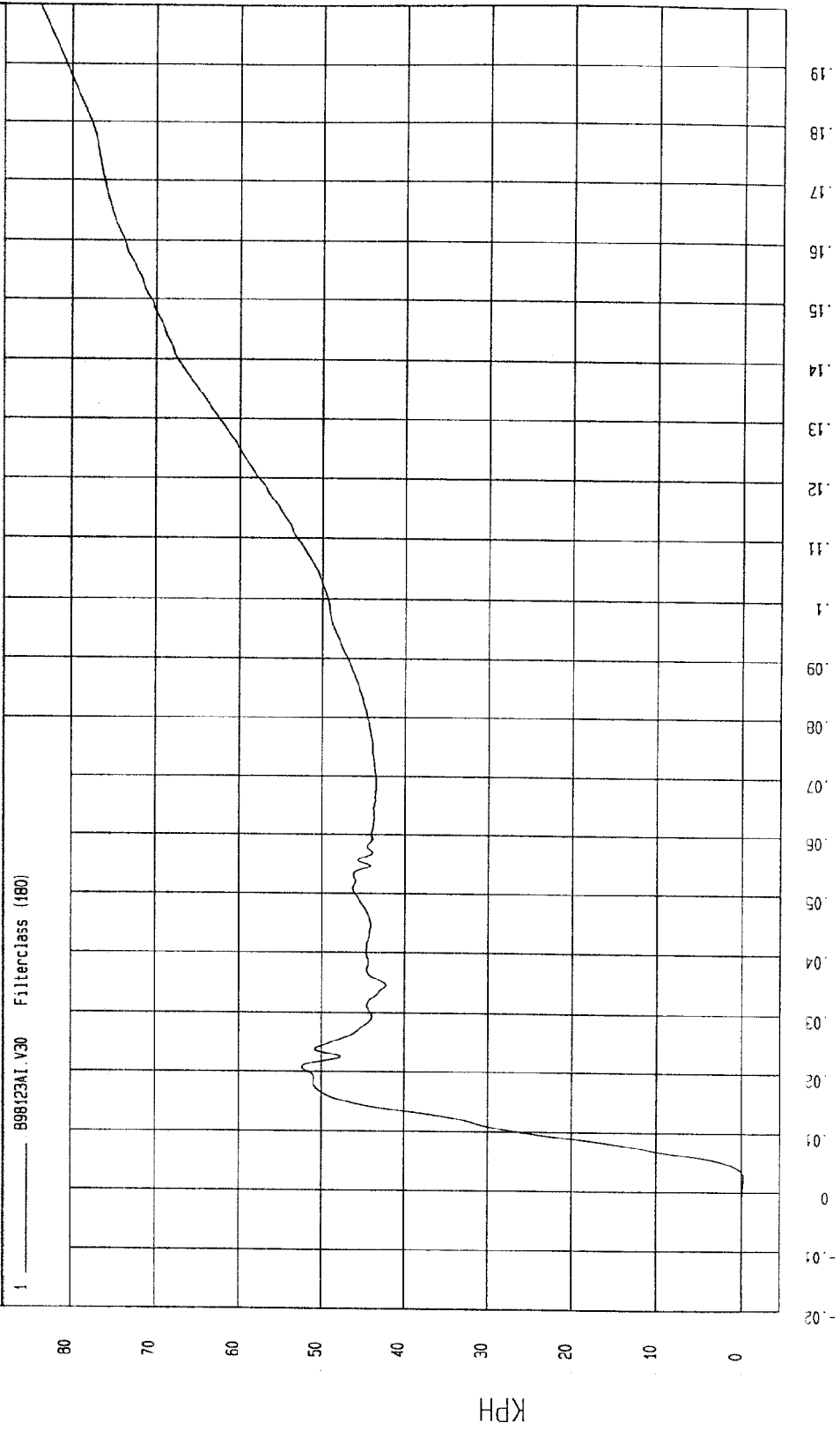


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -.25 KPH at 2 msec Maximum = 83.74 KPH at 200 msec

LEFT LOWER B-POST Y VELOCITY



TEST DATE: 12-18-1998

TEST: HIGH SPEED LATERAL IMPACT

Speed: 38.4 MPH 61.8 KPH

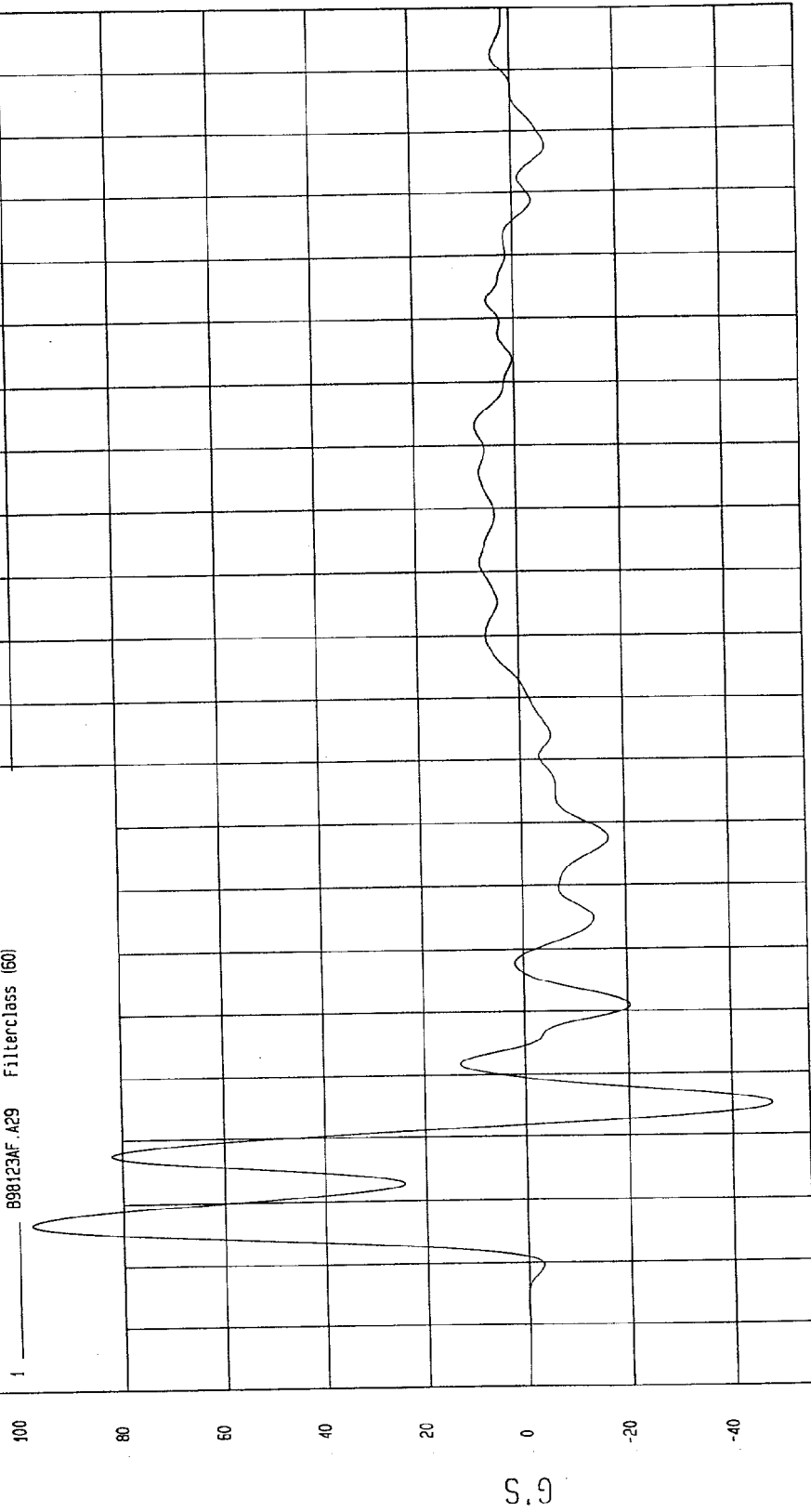
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 97.83 G'S at 7 msec

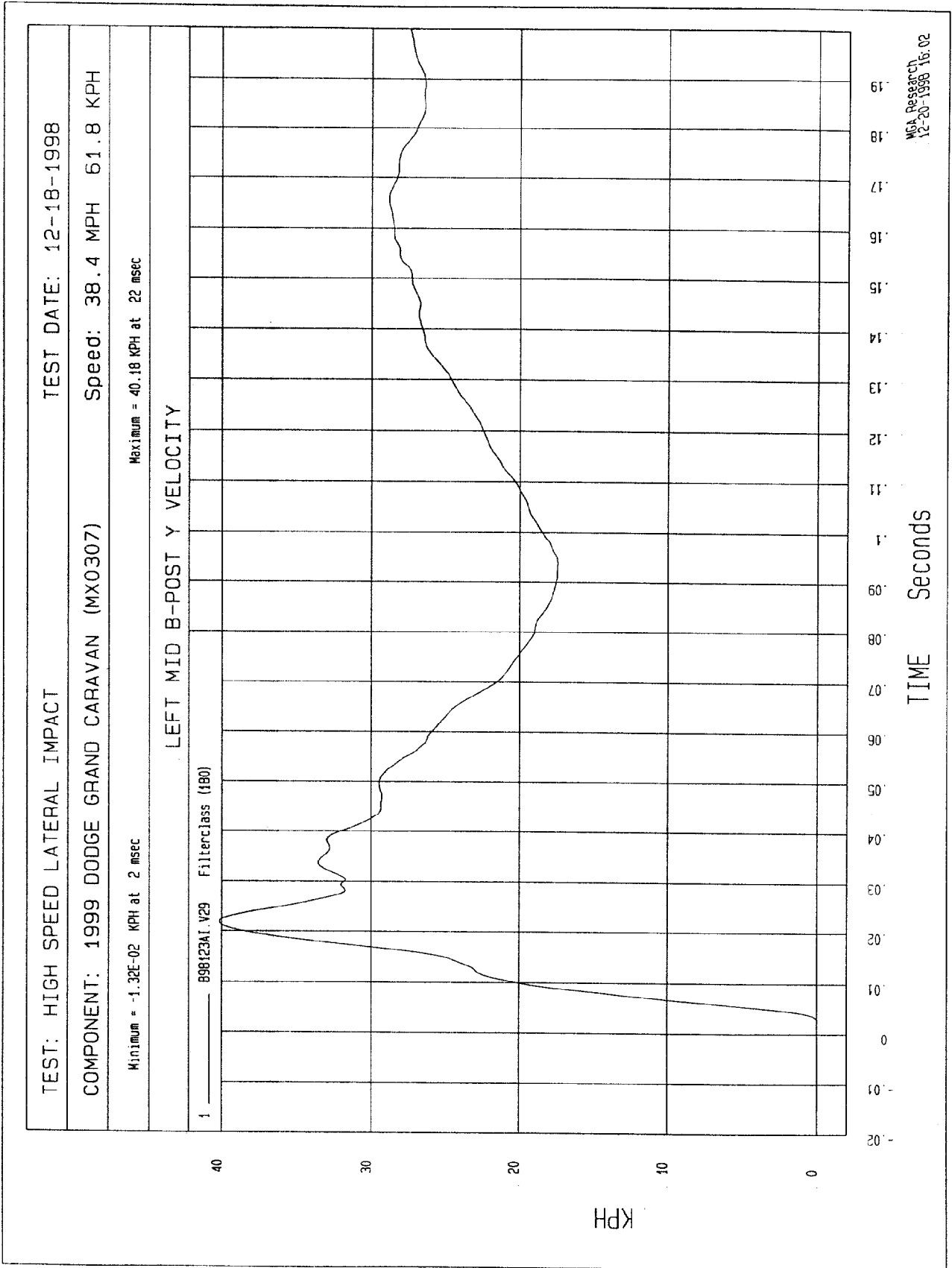
Minimum = -48.06 G'S at 25 msec

LEFT MID B-POST Y ACCELERATION

1 B98123AF A29 Filterclass (60)



NSA Research
12-20-1998 16:02

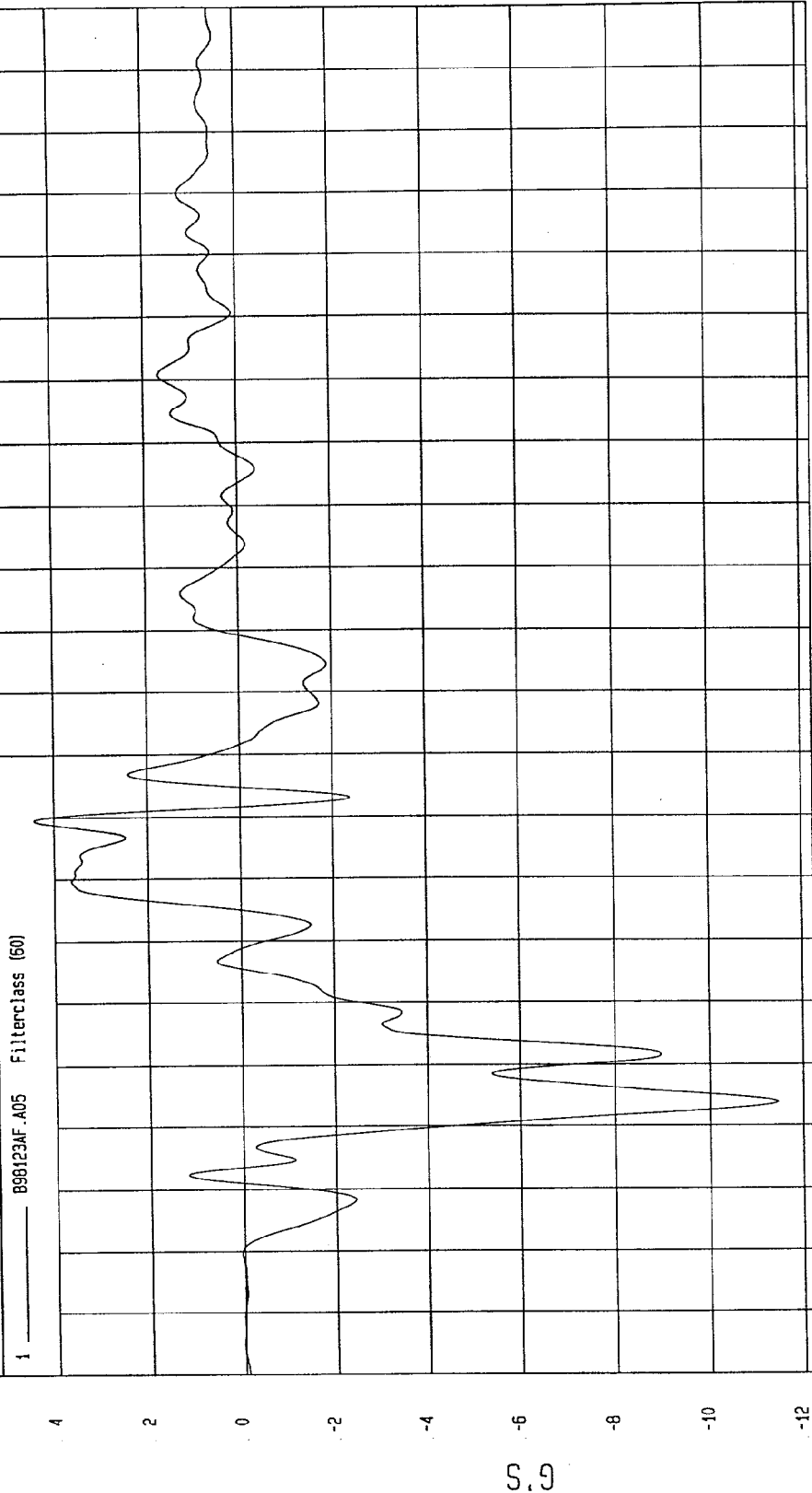


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

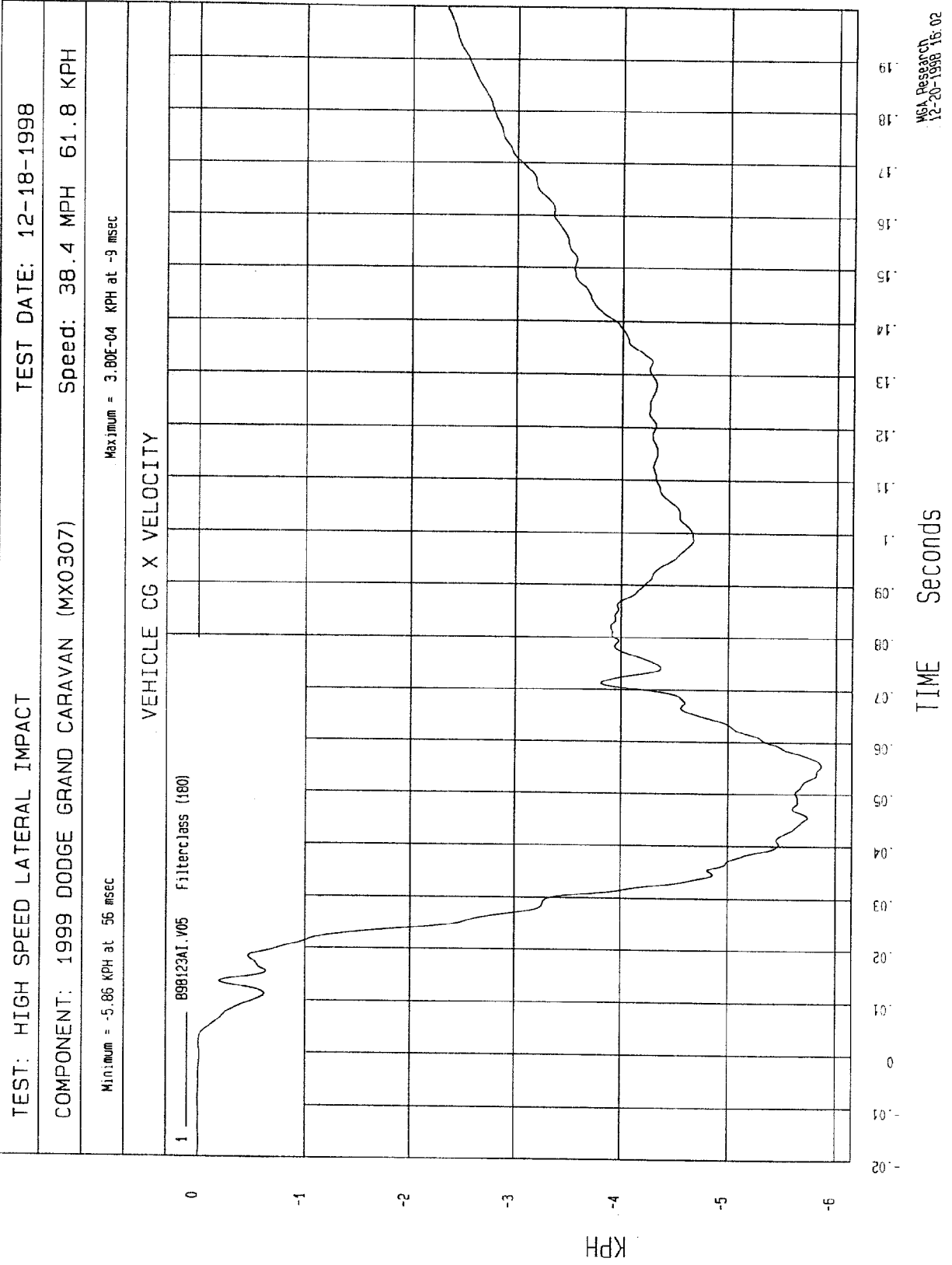
Minimum = -11.46 G'S at 24 msec Maximum = 4.43 G'S at 70 msec

VEHICLE CG X ACCELERATION



TIME (SECONDS)

NSA Research
12-20-1998 16:02

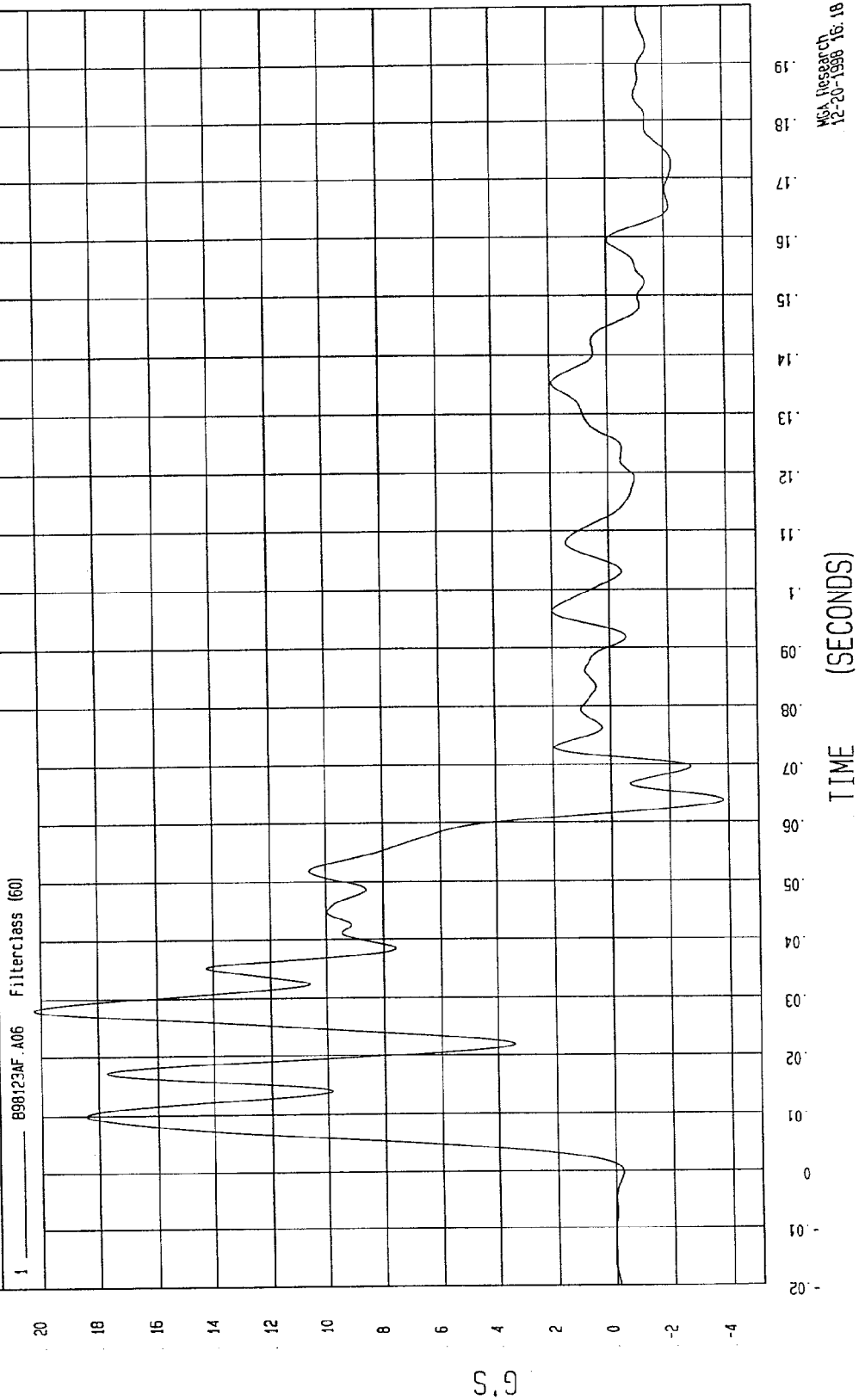


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -3.82 G'S at 64 msec Maximum = 20.23 G'S at 28 msec

VEHICLE CG Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

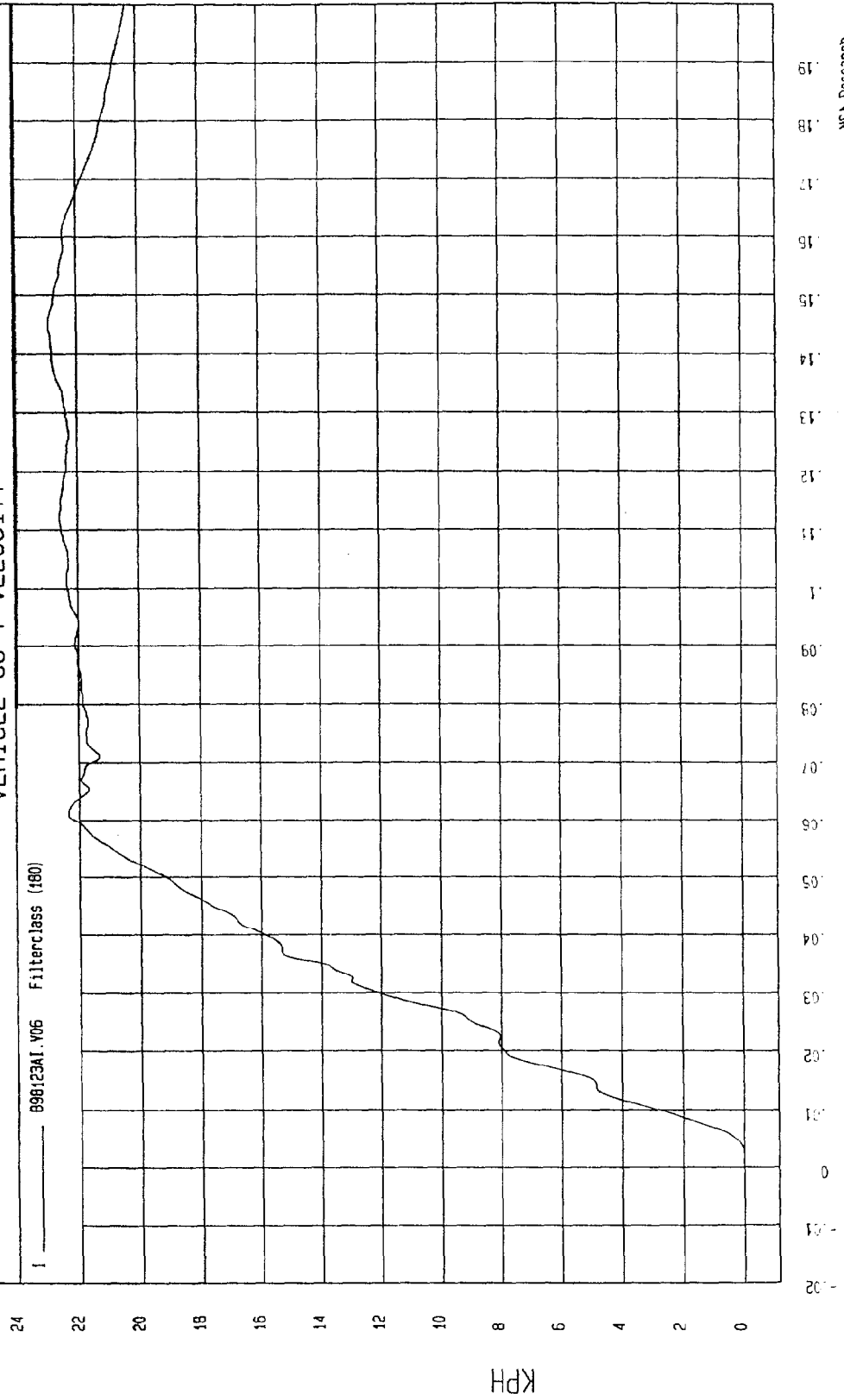
Speed: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 22.91 KPH at 145 msec

Minimum = -1.00E-02 KPH at -1 msec

VEHICLE CG Y VELOCITY



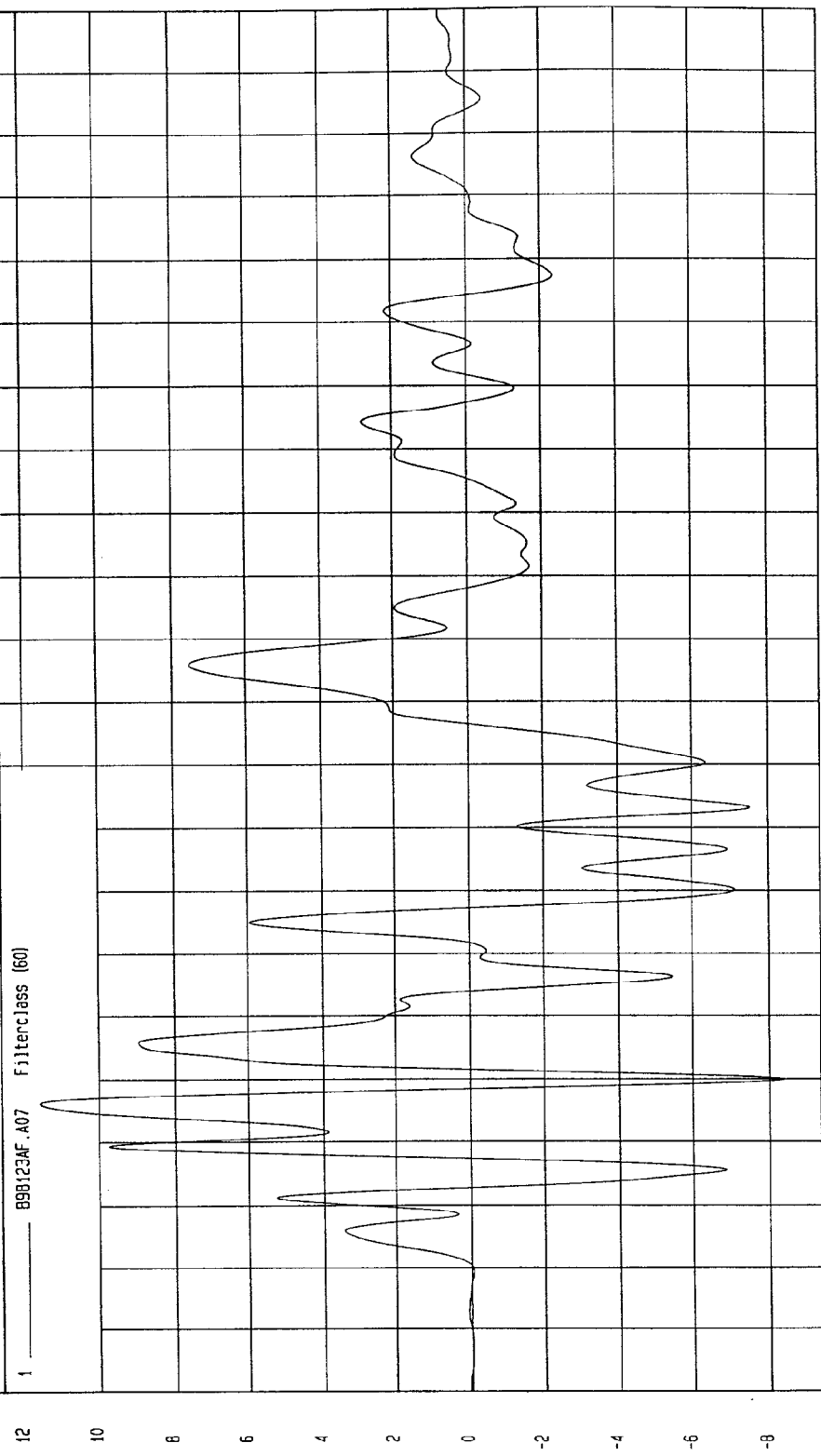
MOA Research
12-20-1998 16:19

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -8.4 G's at 30 msec Maximum = 11.59 G's at 26 msec

VEHICLE CG Z ACCELERATION



NCA Research
12-20-1998 16.02

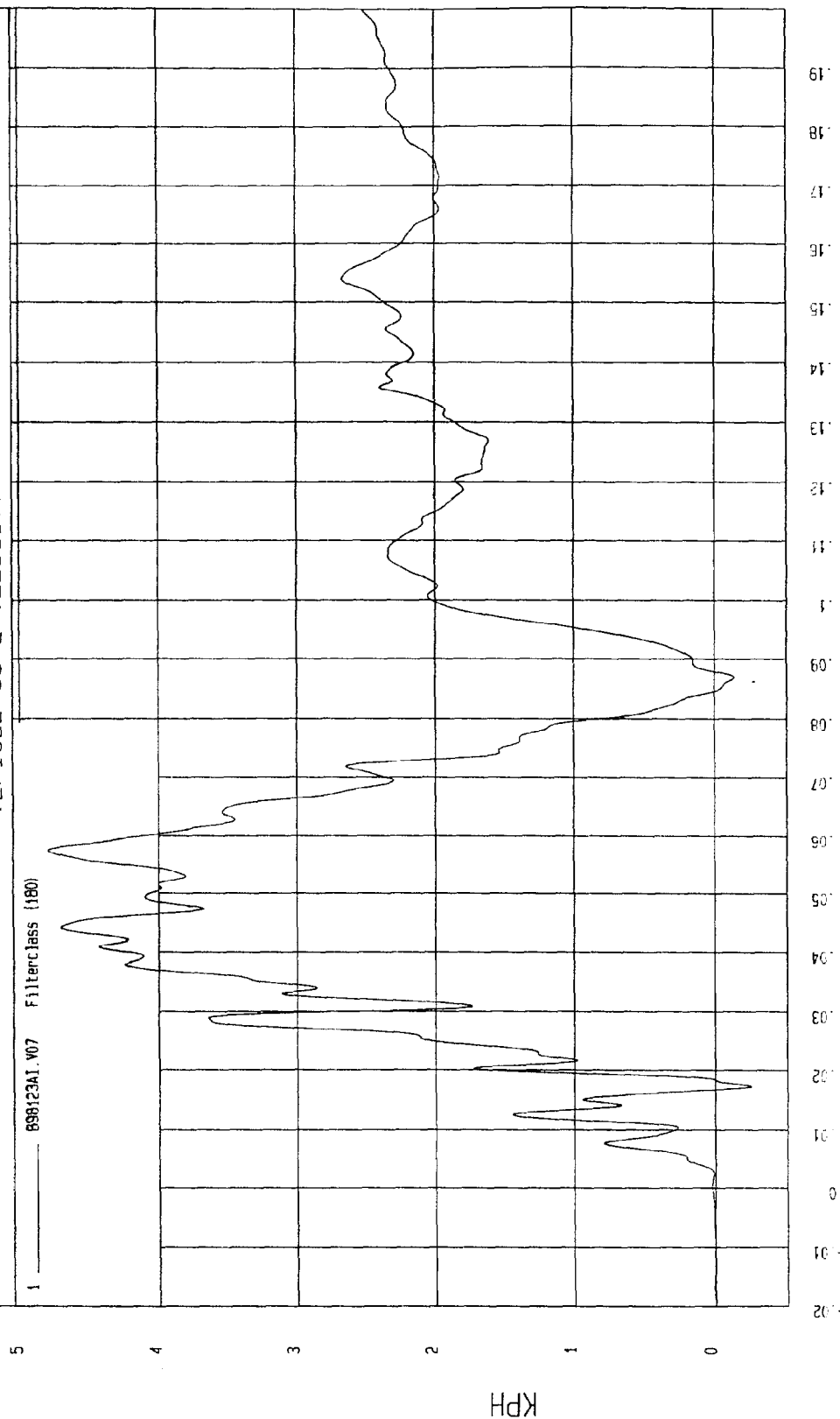
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -.26 KPH at 17 msec Maximum = 4.8 KPH at 57 msec

VEHICLE CG Z VELOCITY

1 898123A1.V07 Filterclass (180)



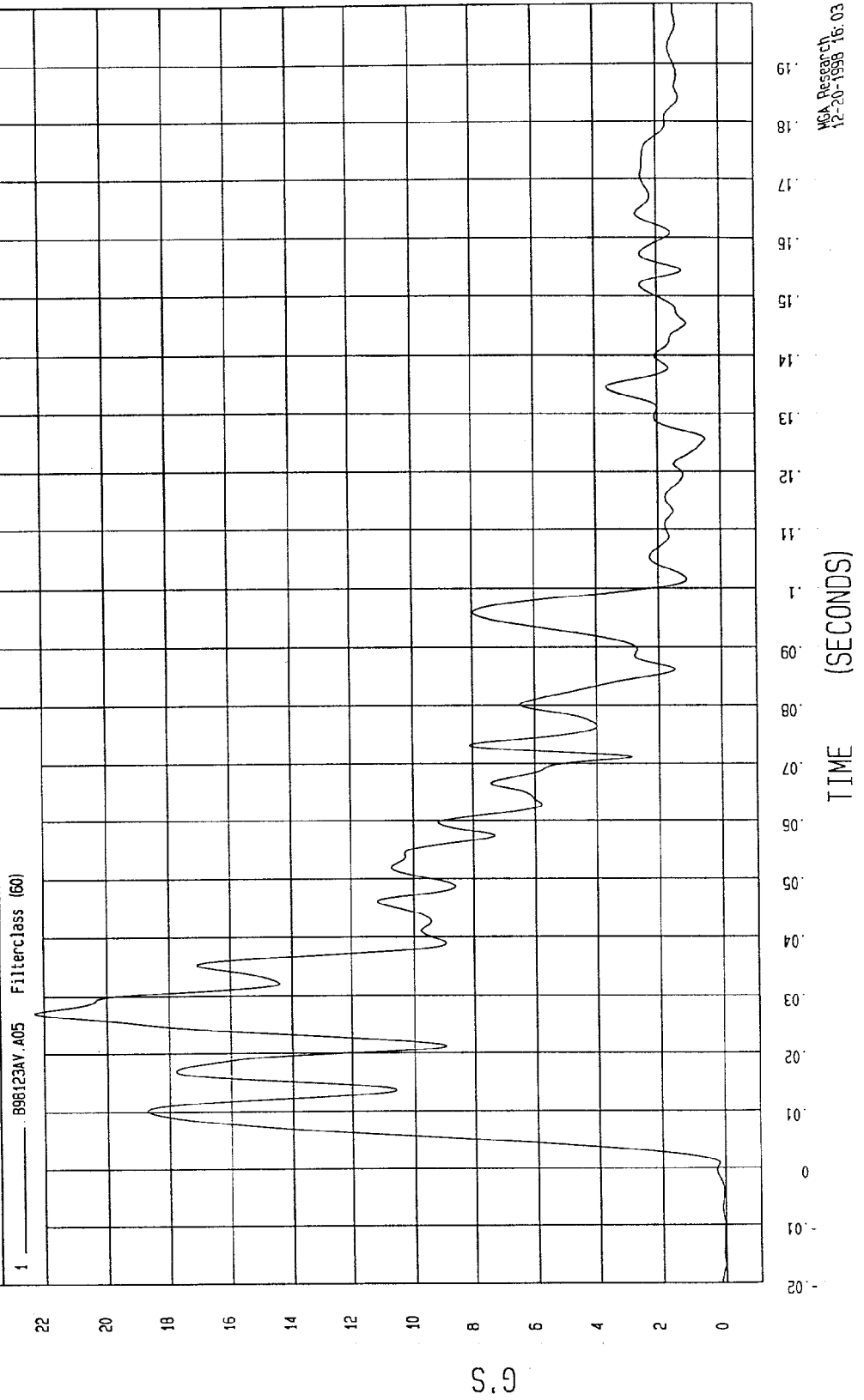
MGA Research
12-20-1998 16:02

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 1.43E-02 G'S at -17 msec Maximum = 22.29 G'S at 27 msec

VEHICLE CG RESULTANT ACCELERATION

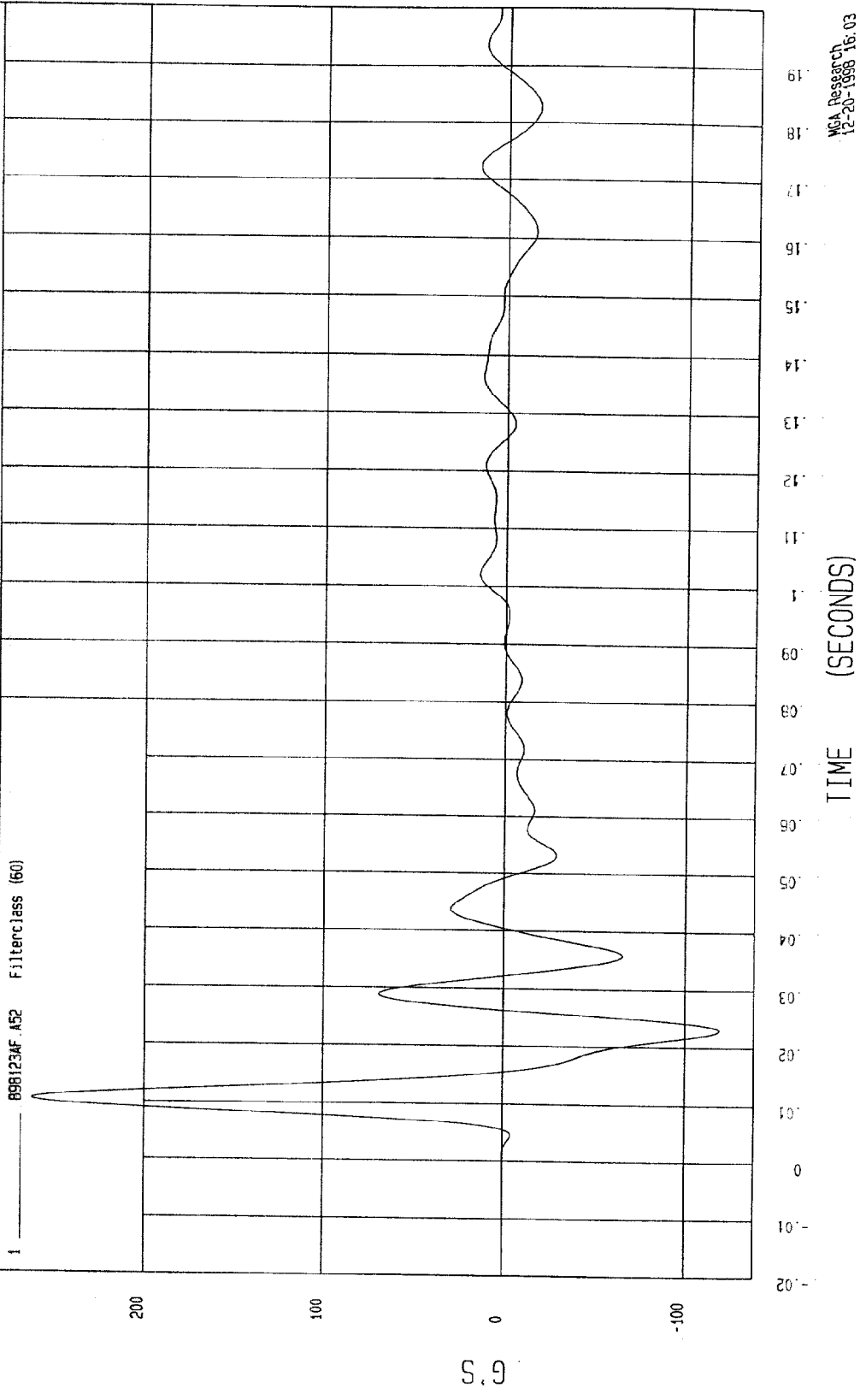


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -119.06 G'S at 23 msec Maximum = 261.25 G'S at 10 msec

LEFT FRONT DOOR MIDREAR Y ACCELERATION

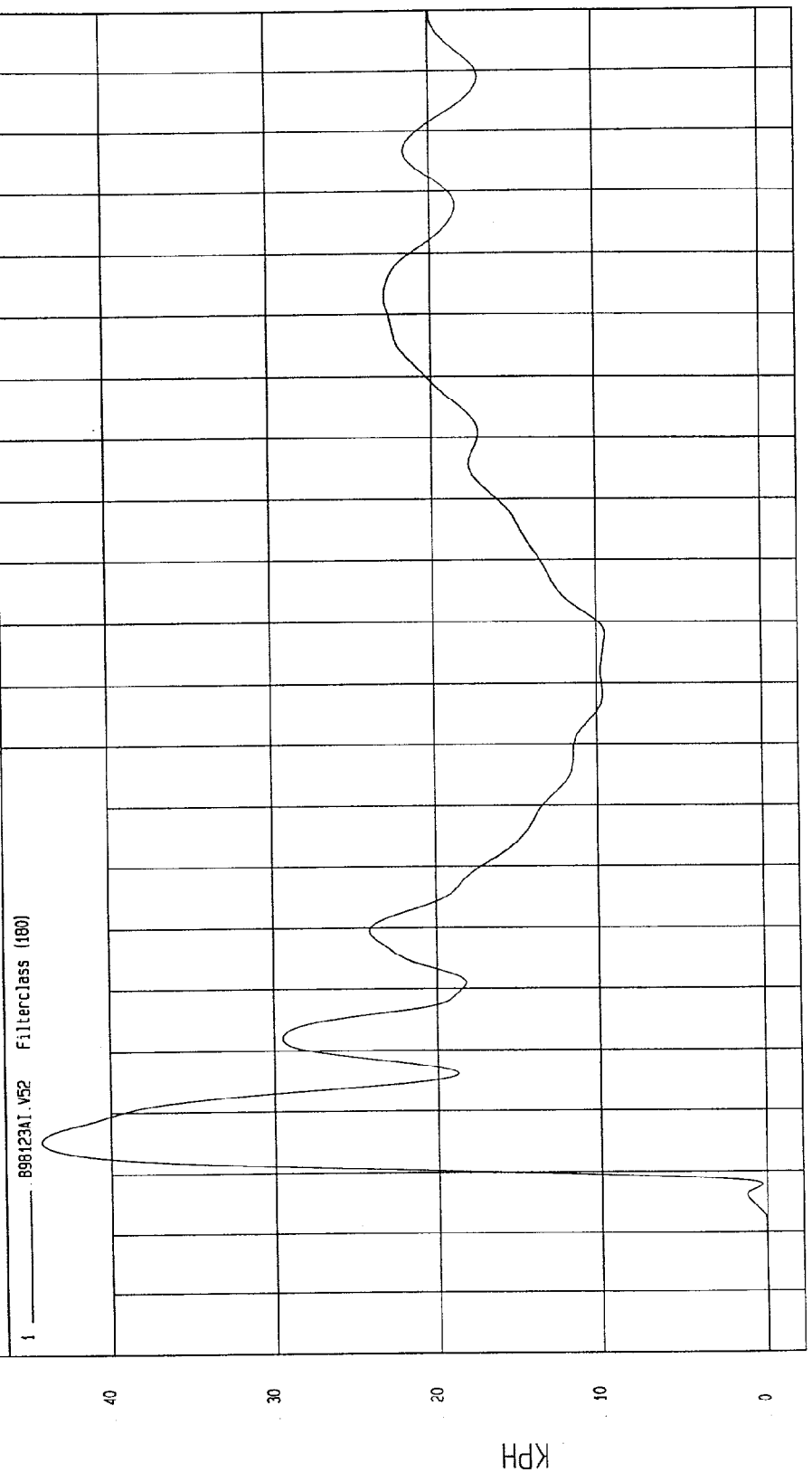


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -2.98E-04 KPH at -20 msec Maximum = 44.22 KPH at 15 msec

LEFT FRONT DOOR MIDREAR Y VELOCITY



TIME Seconds

WCA Research
12-20-1998 16.03

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

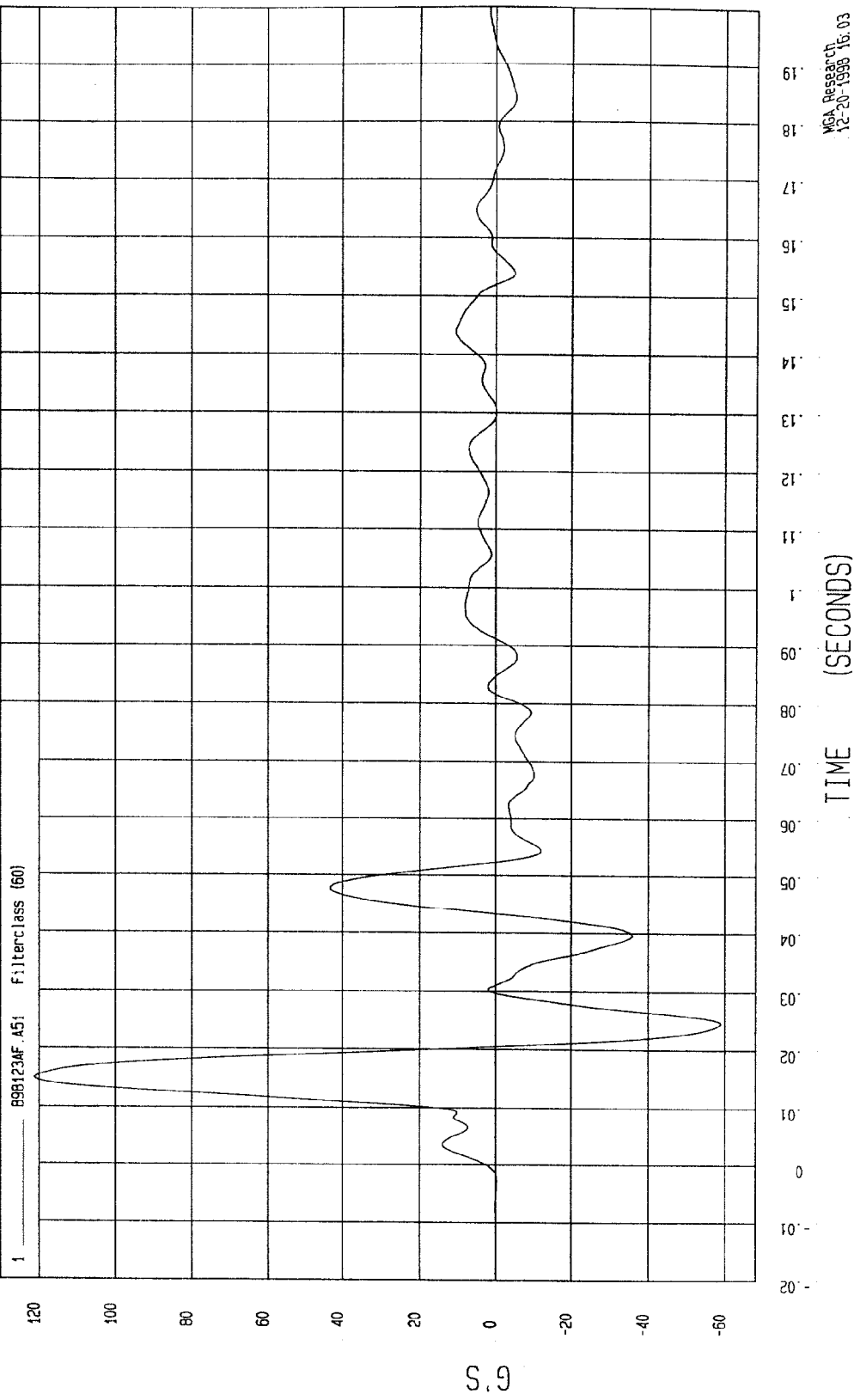
SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

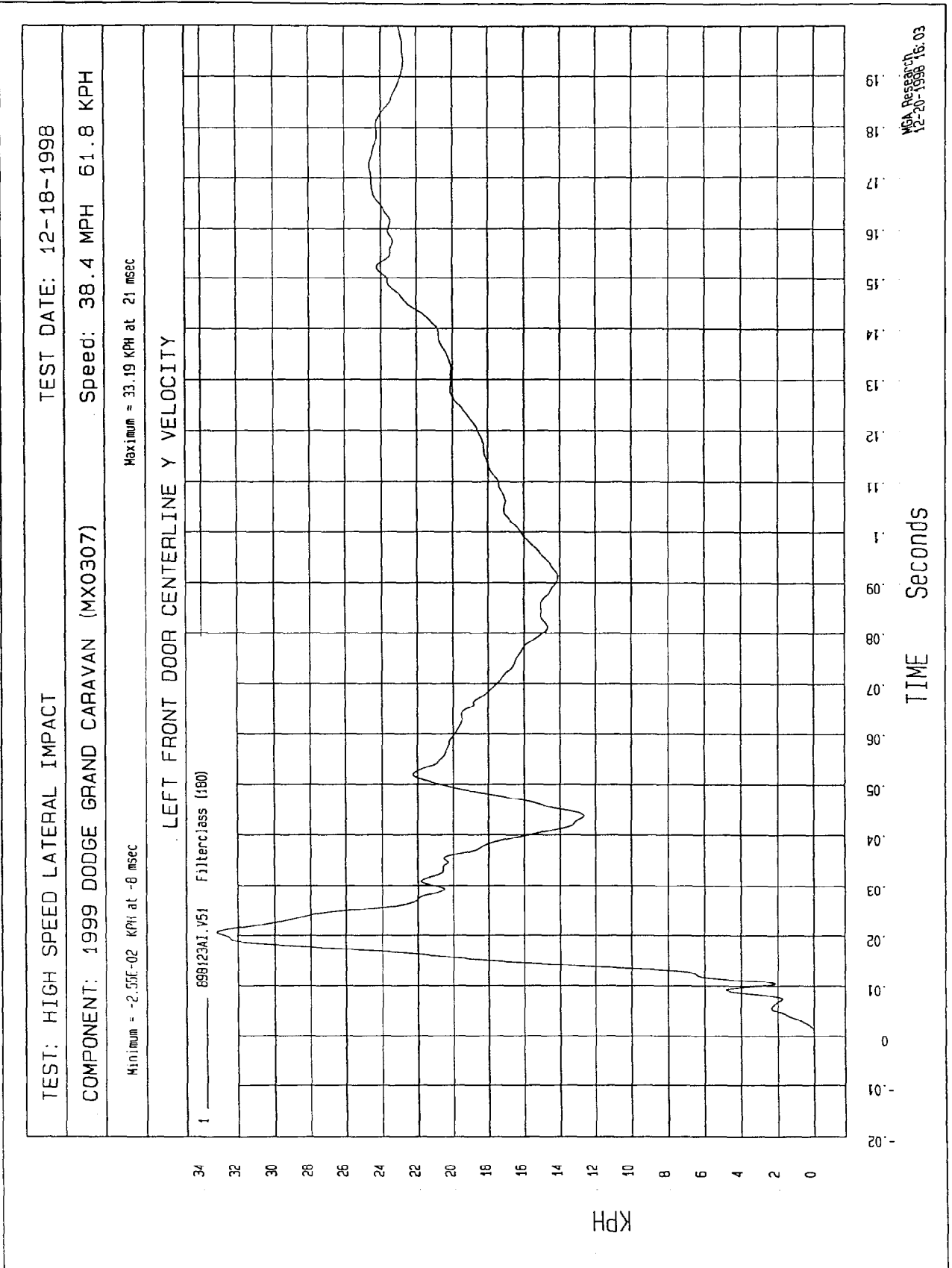
Maximum = 121.12 G'S at 15 msec

Minimum = -58.91 G'S at 25 msec

LEFT FRONT DOOR CENTERLINE Y ACCELERATION



MGA Research
12-20-1998 16.03



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

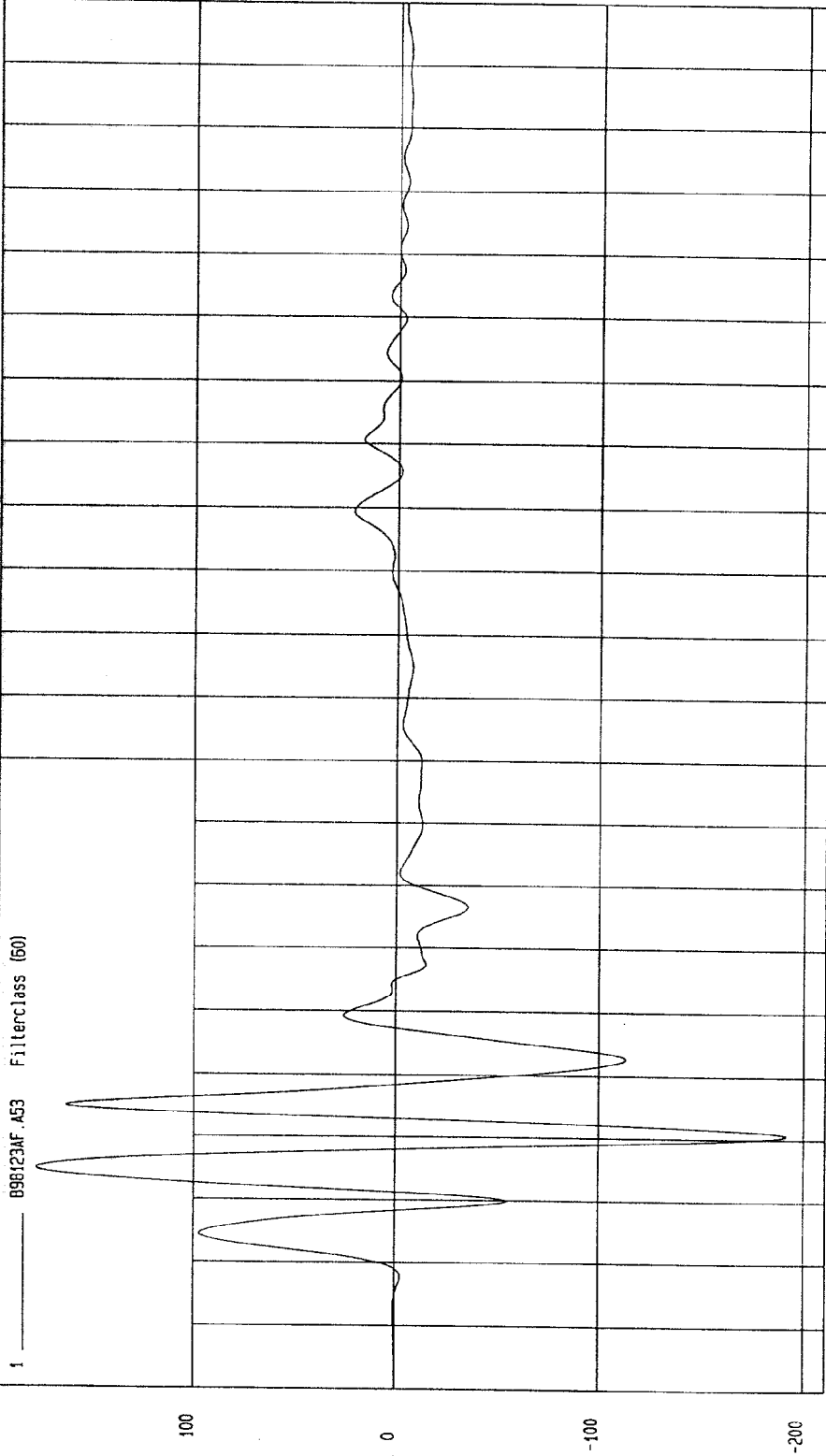
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 176.59 G'S at 15 msec

Minimum = -191.77 G'S at 21 msec

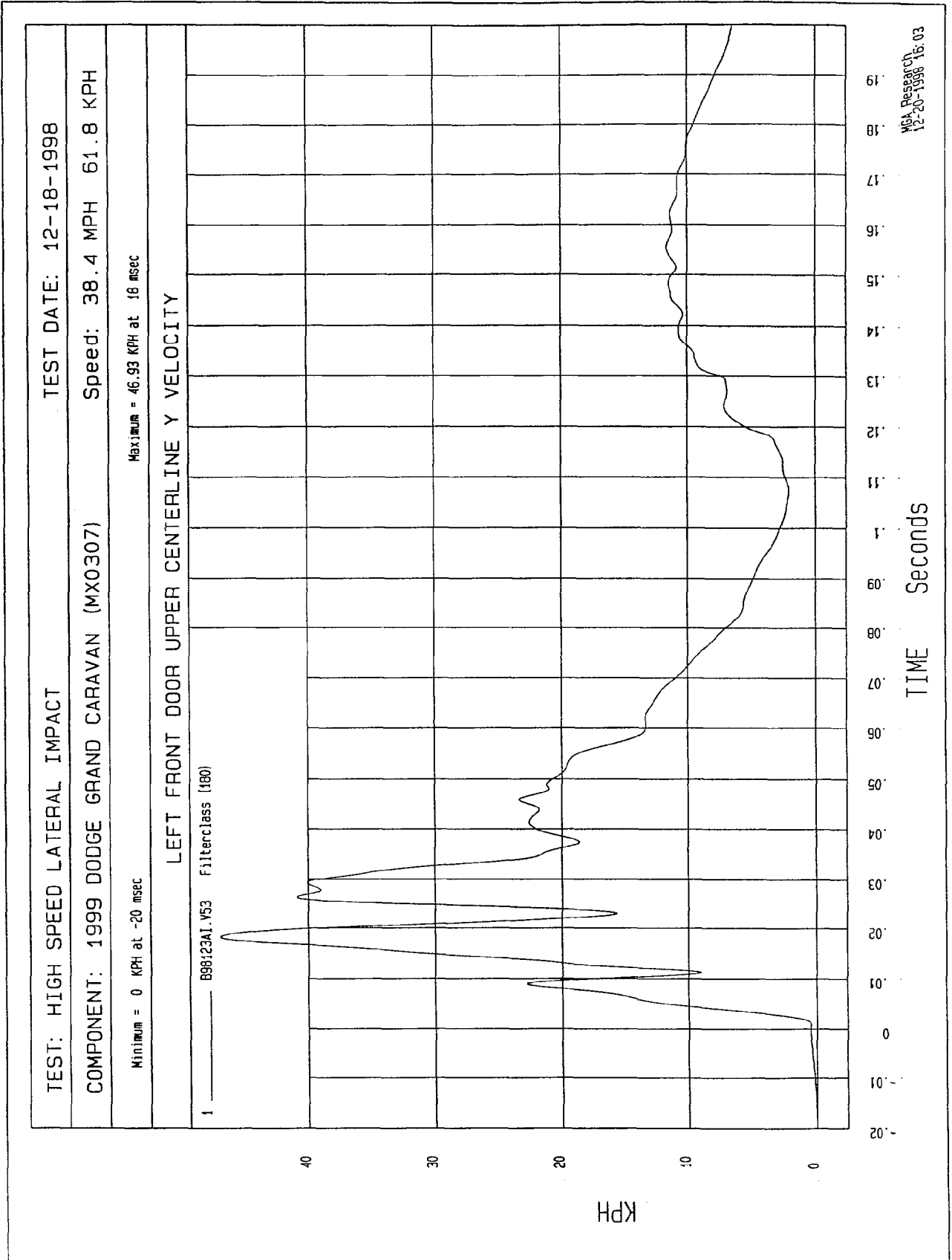
LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION

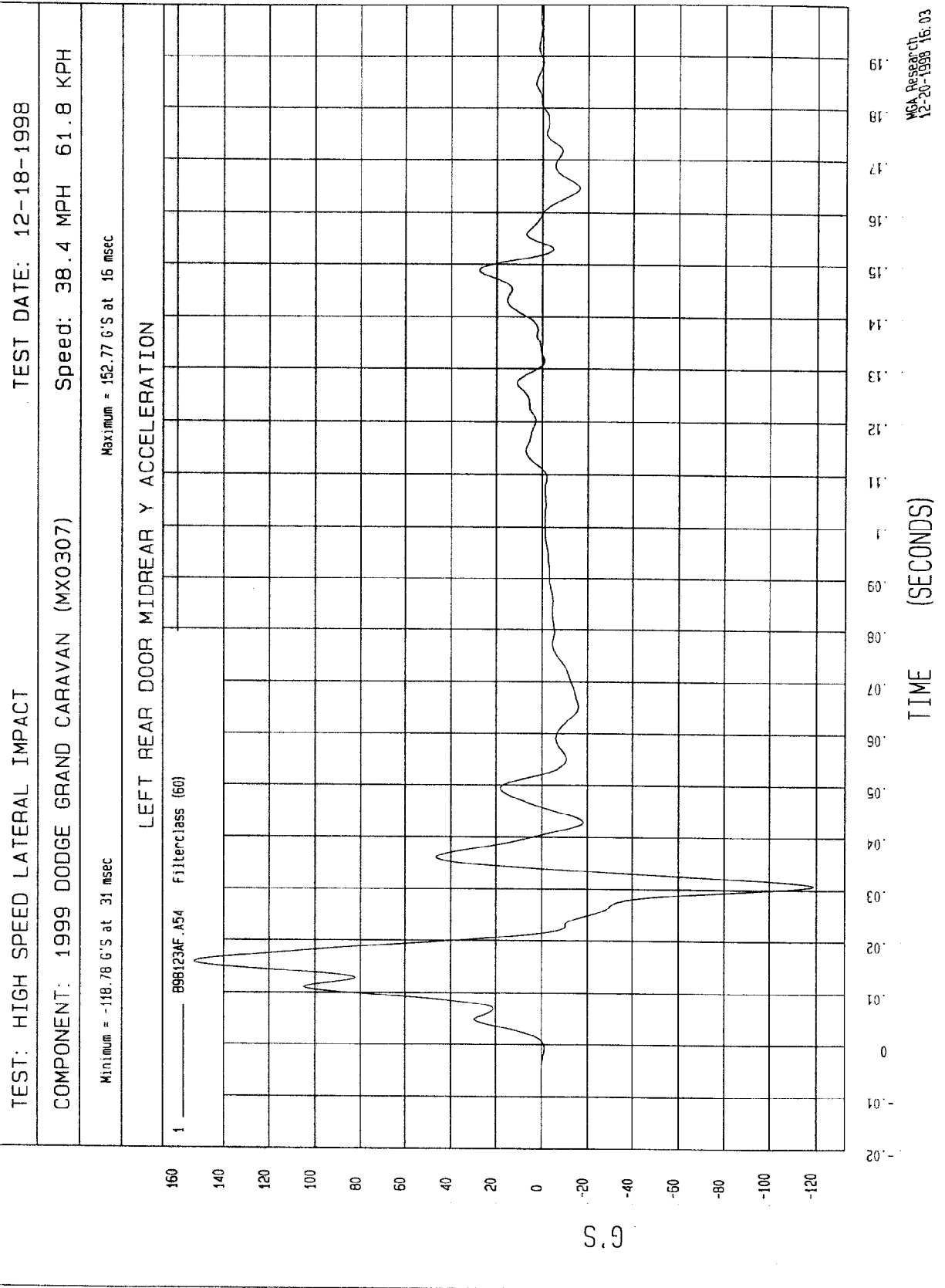
1 ——— 898123AF.A53 Filterclass (50)

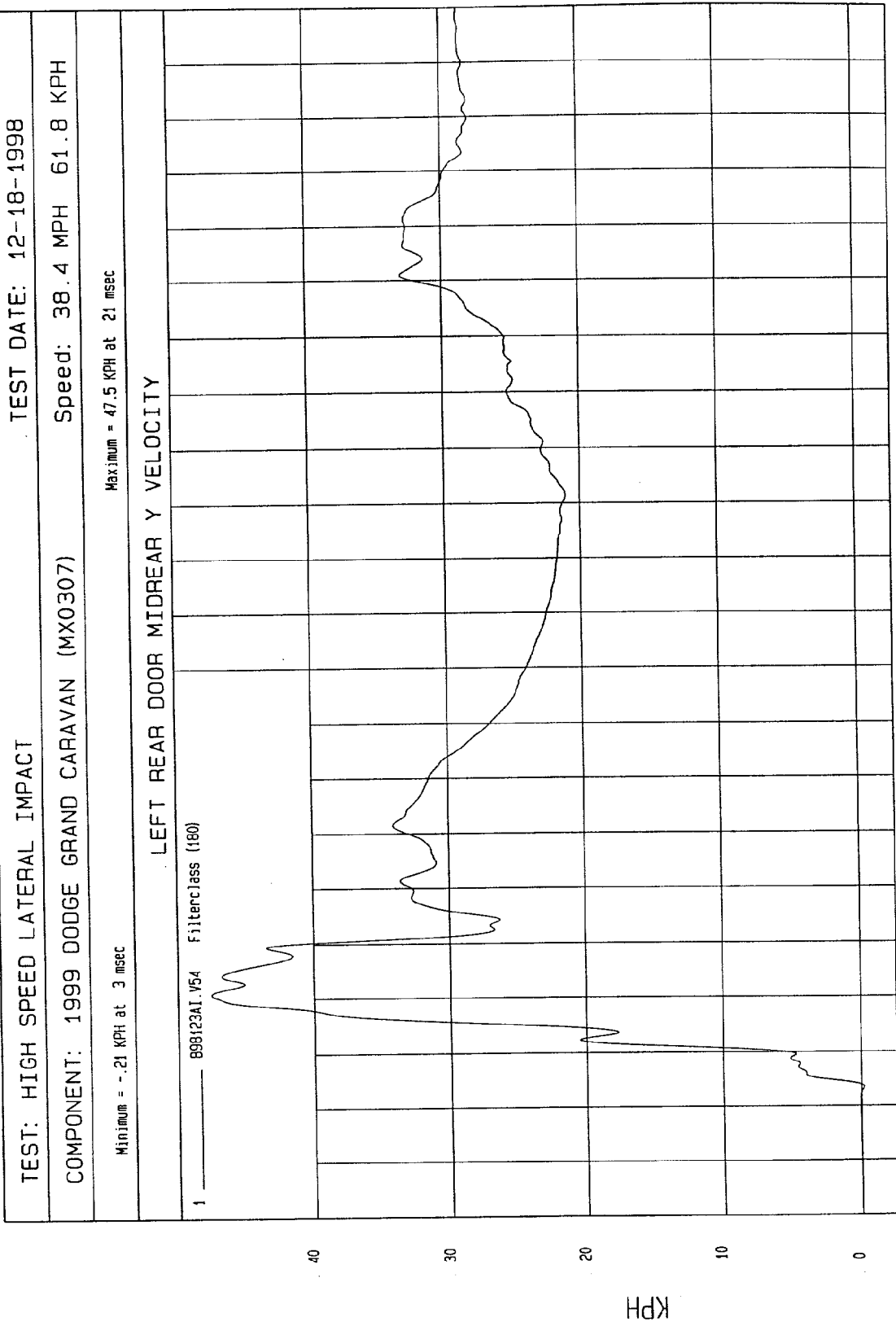


MSA Research
12-20-1998 16:03

TIME (SECONDS)







MOA Research
12-20-1998 16:03

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

SPEED: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

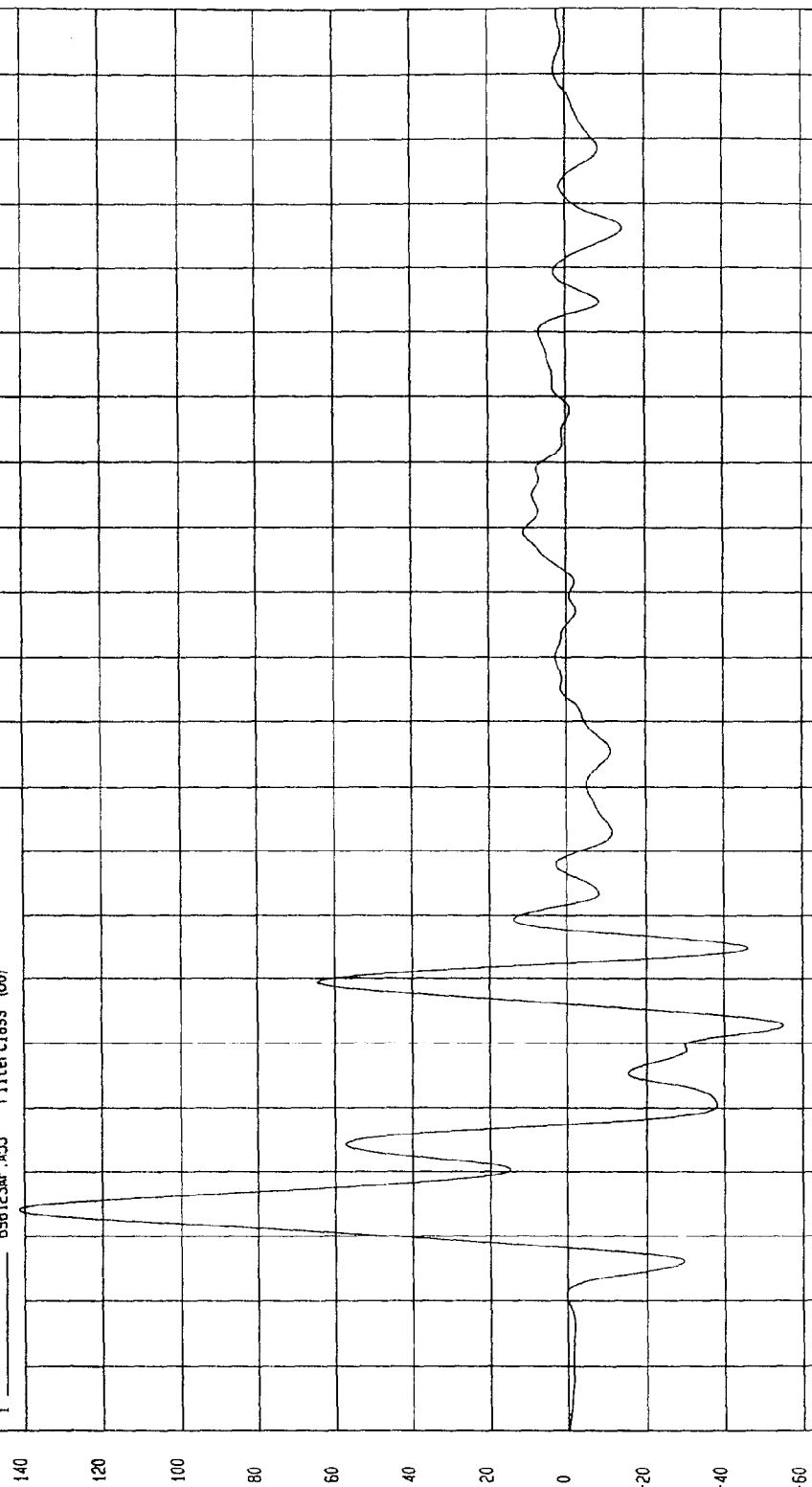
Maximum = 141.31 G'S at 14 msec

Minimum = -54.97 G'S at 43 msec

LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION

1 896123AF.A55 Filterclass (60)

G



MSA Research
12-20-1998 16.03

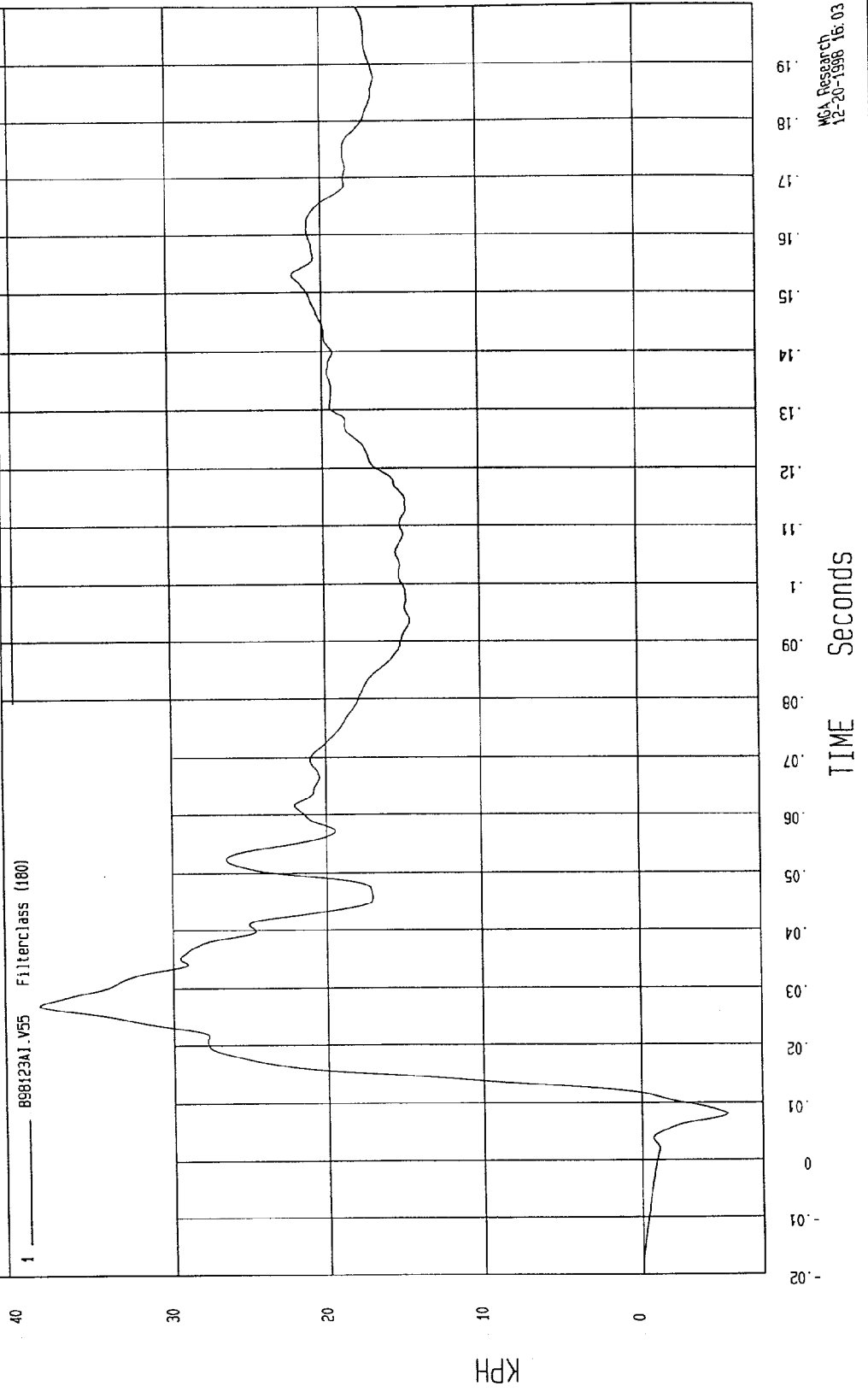
TIME (SECONDS)

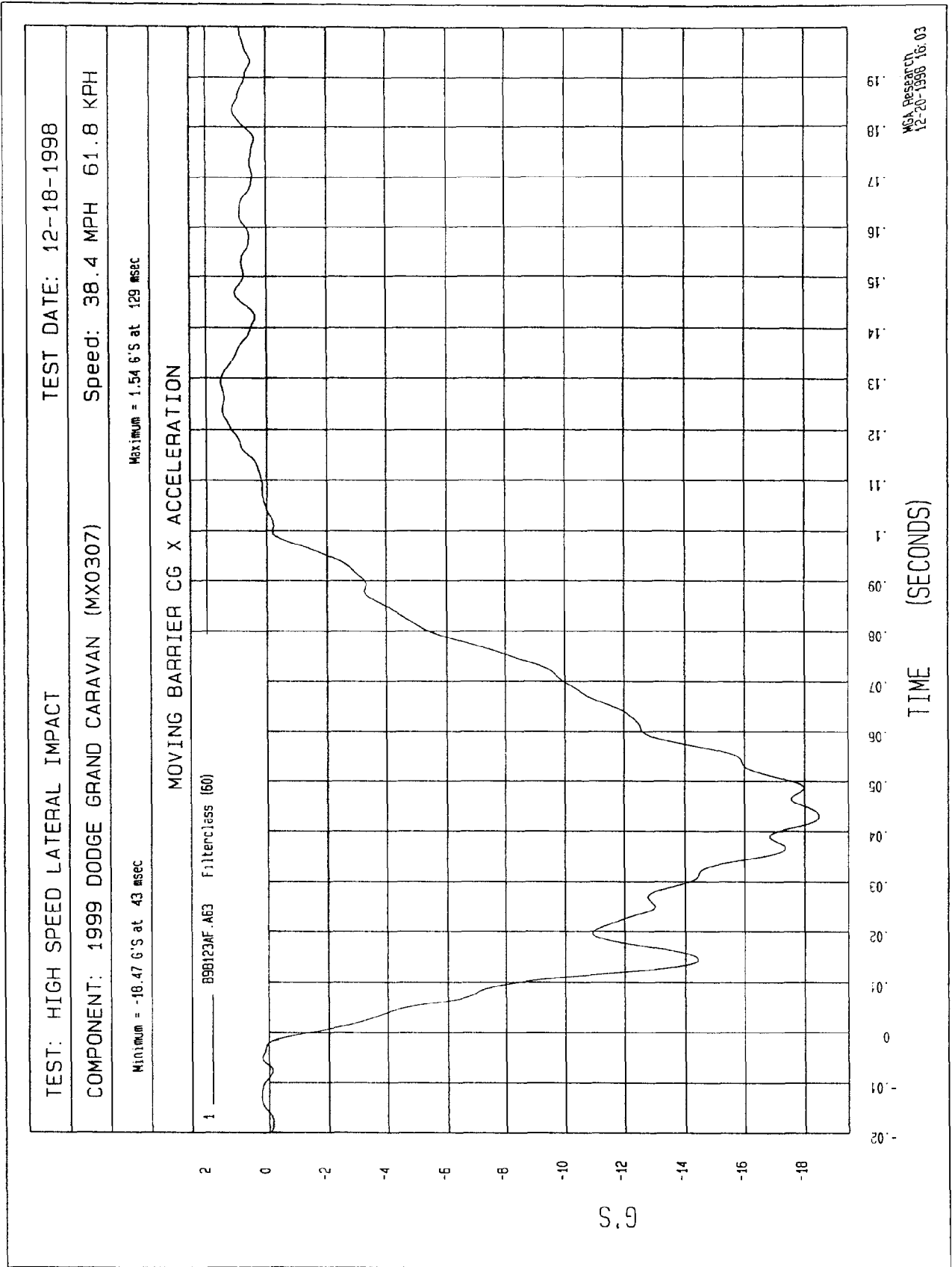
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -5.37 KPH at 8 msec Maximum = 38.5 KPH at 27 msec

LEFT REAR DOOR UPPER CENTERLINE Y VELOCITY



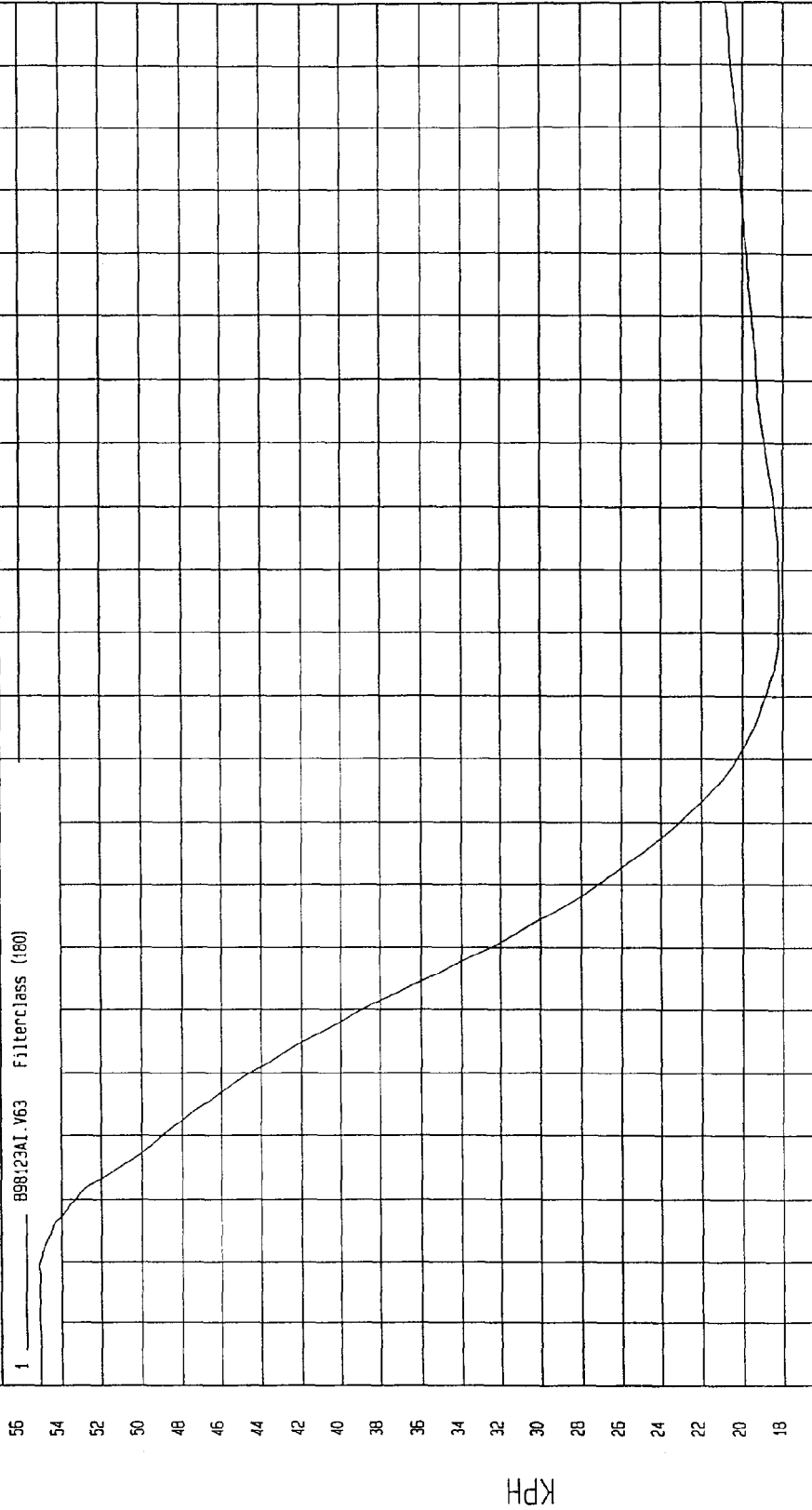


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 18.18 KPH at 103 msec Maximum = 55.12 KPH at -1 msec

MOVING BARRIER CG X VELOCITY



TIME Seconds

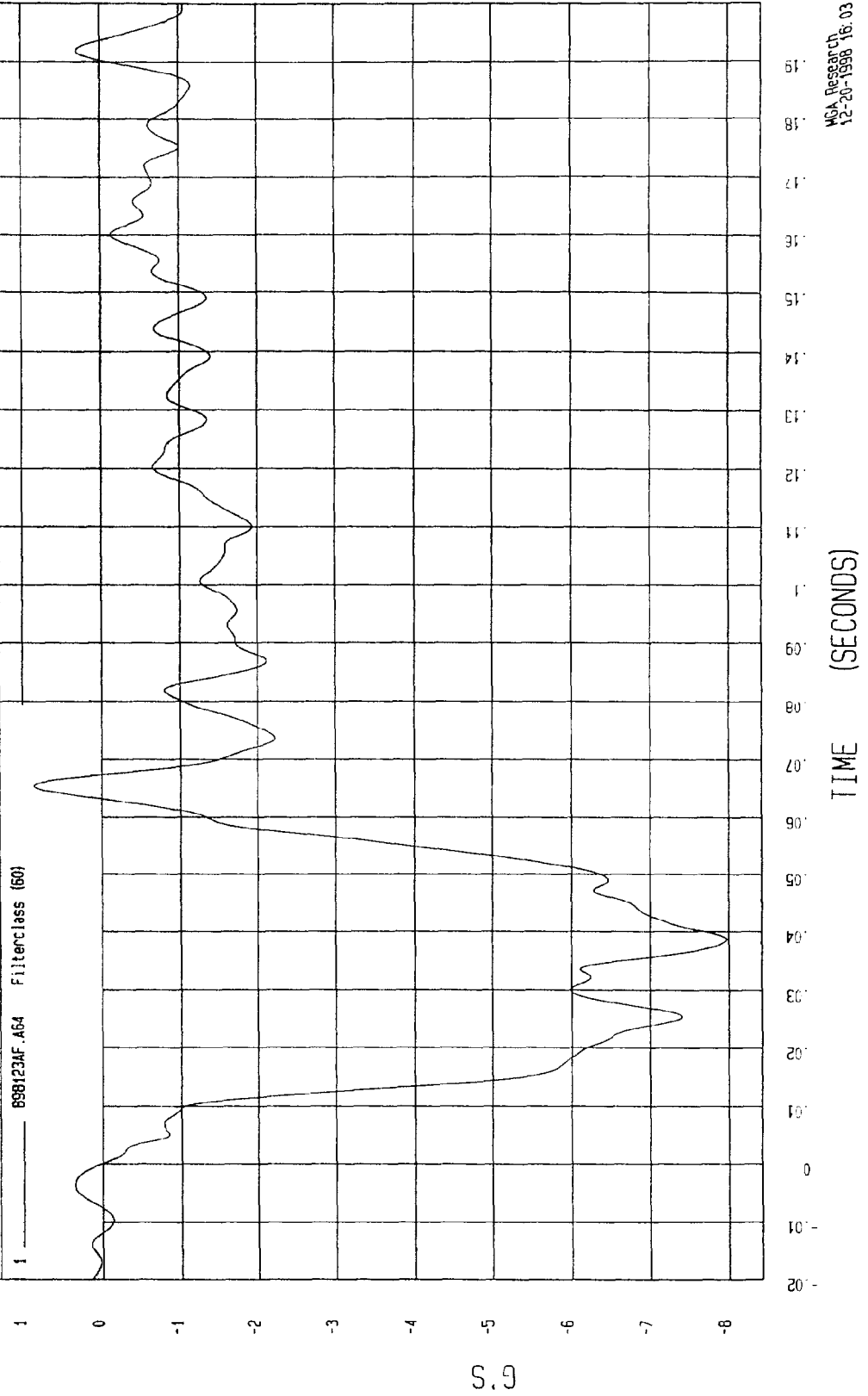
MSA Research
12-20-1998 16.03

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -7.97 G'S at 39 msec Maximum = .86 G'S at 56 msec

MOVING BARRIER CG Y ACCELERATION

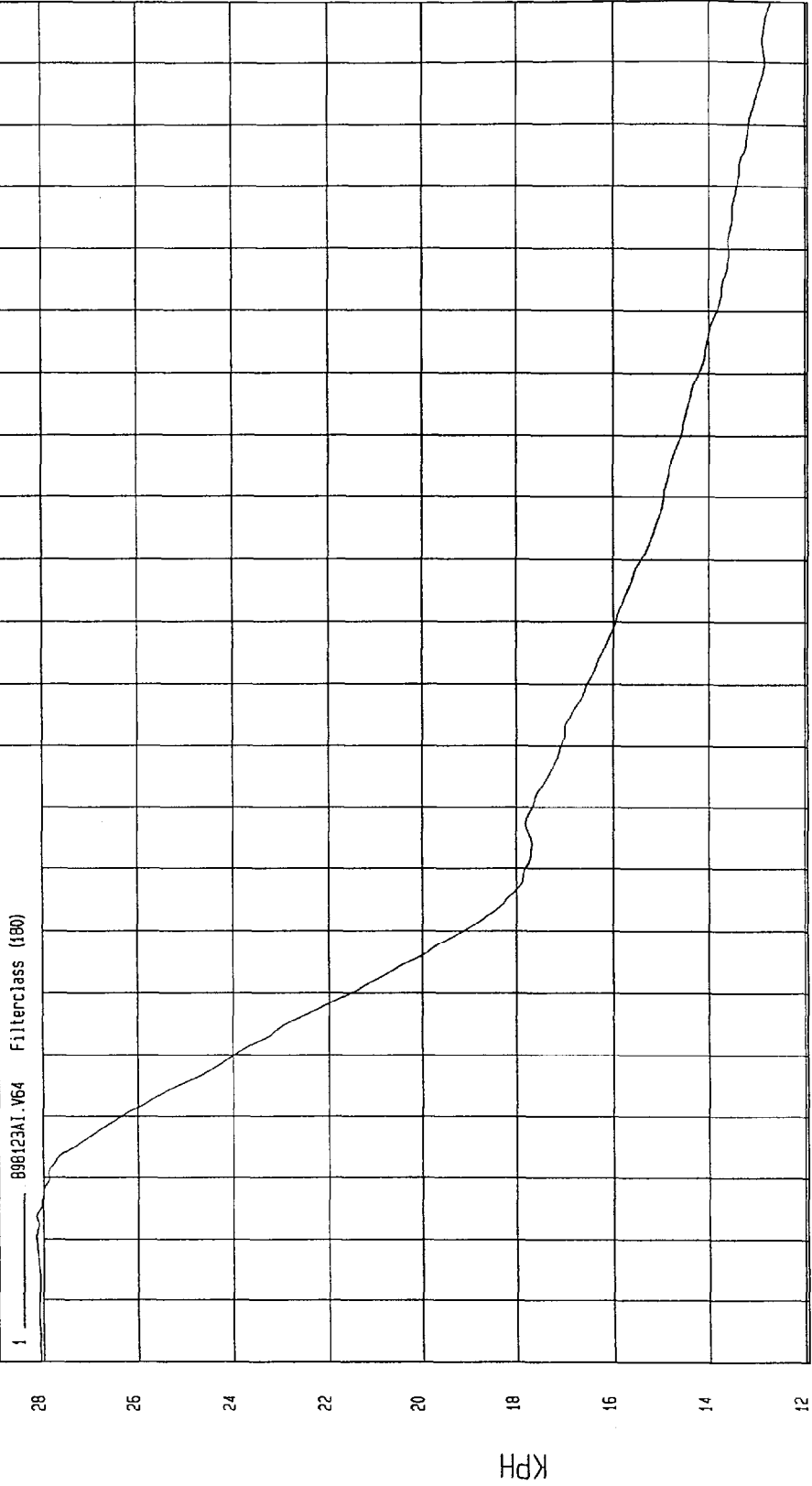


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 12.71 KPH at 200 msec Maximum = 28.14 KPH at 4 msec

MOVING BARRIER CG Y VELOCITY



TIME Seconds

WGA Research
12-20-1999 16:03

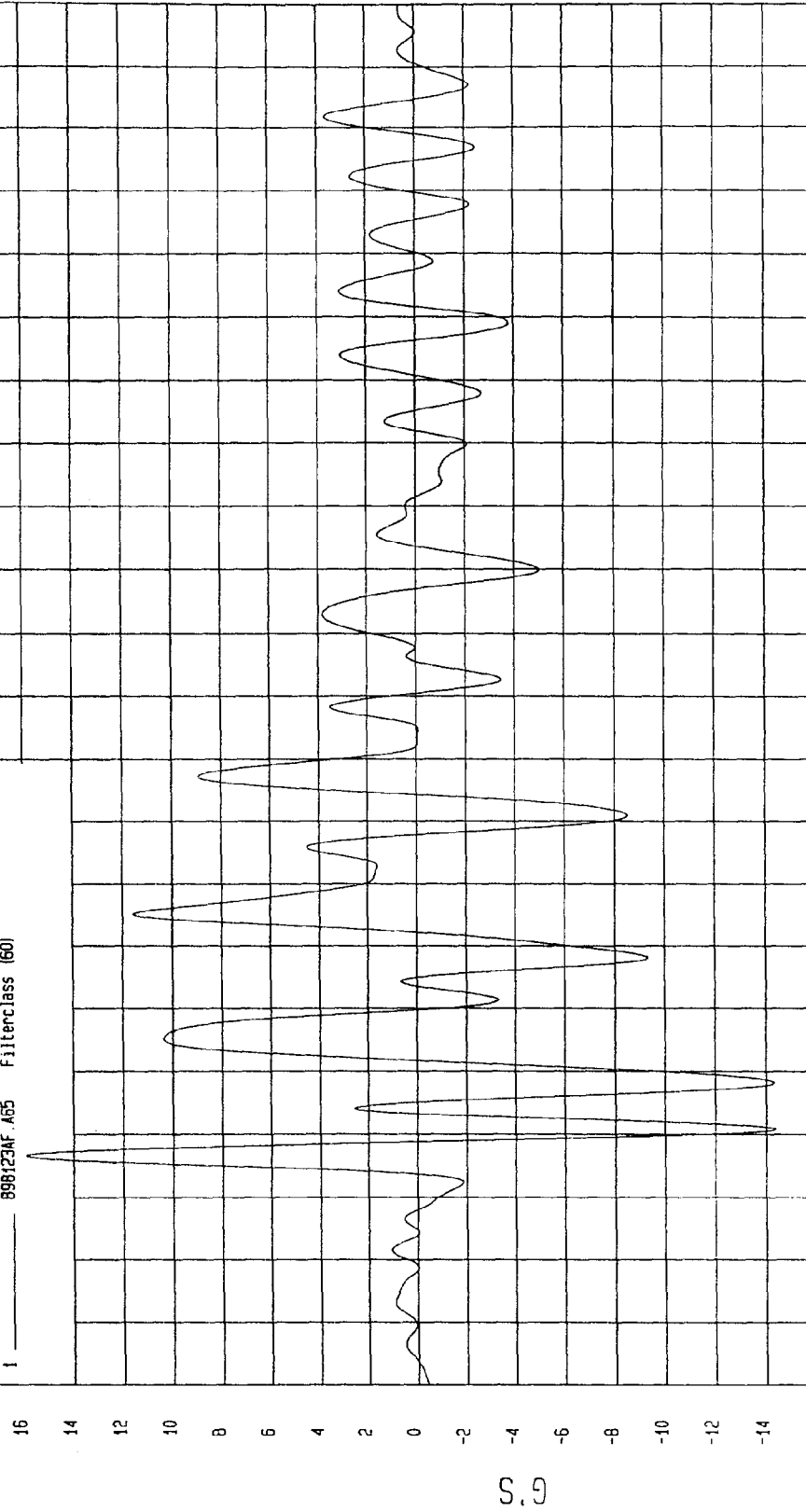
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

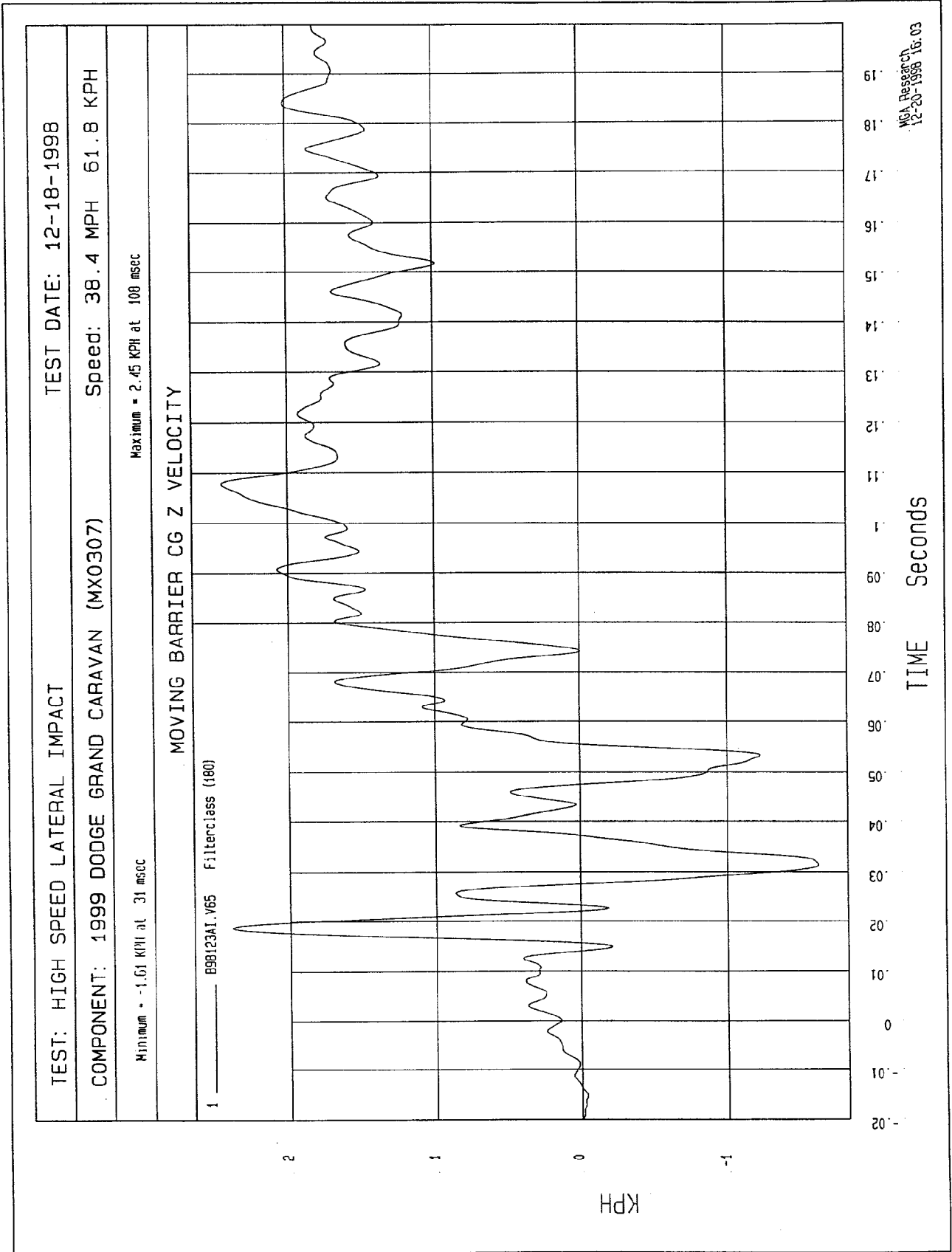
Minimum = -14.39 G'S at 21 msec
Maximum = 15.91 G'S at 17 msec

MOVING BARRIER CG Z ACCELERATION

1 898123AF.A65 Filterclass (60)



MGA Research
12-20-1998 15:03

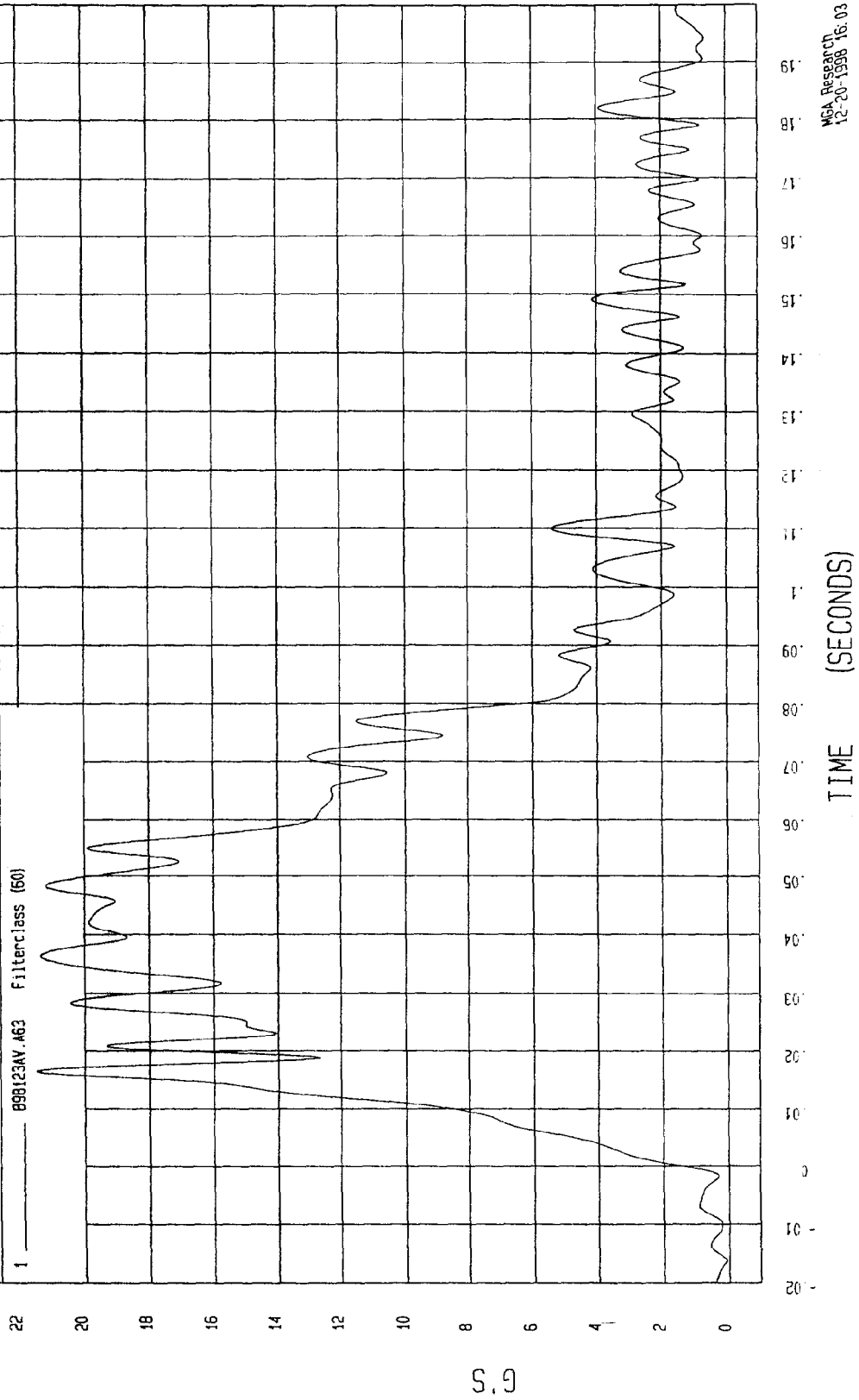


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 0.01E-02 G'S at -16 msec
Maximum = 21.51 G'S at 16 msec

MOVING BARRIER CG RESULTANT ACCELERATION



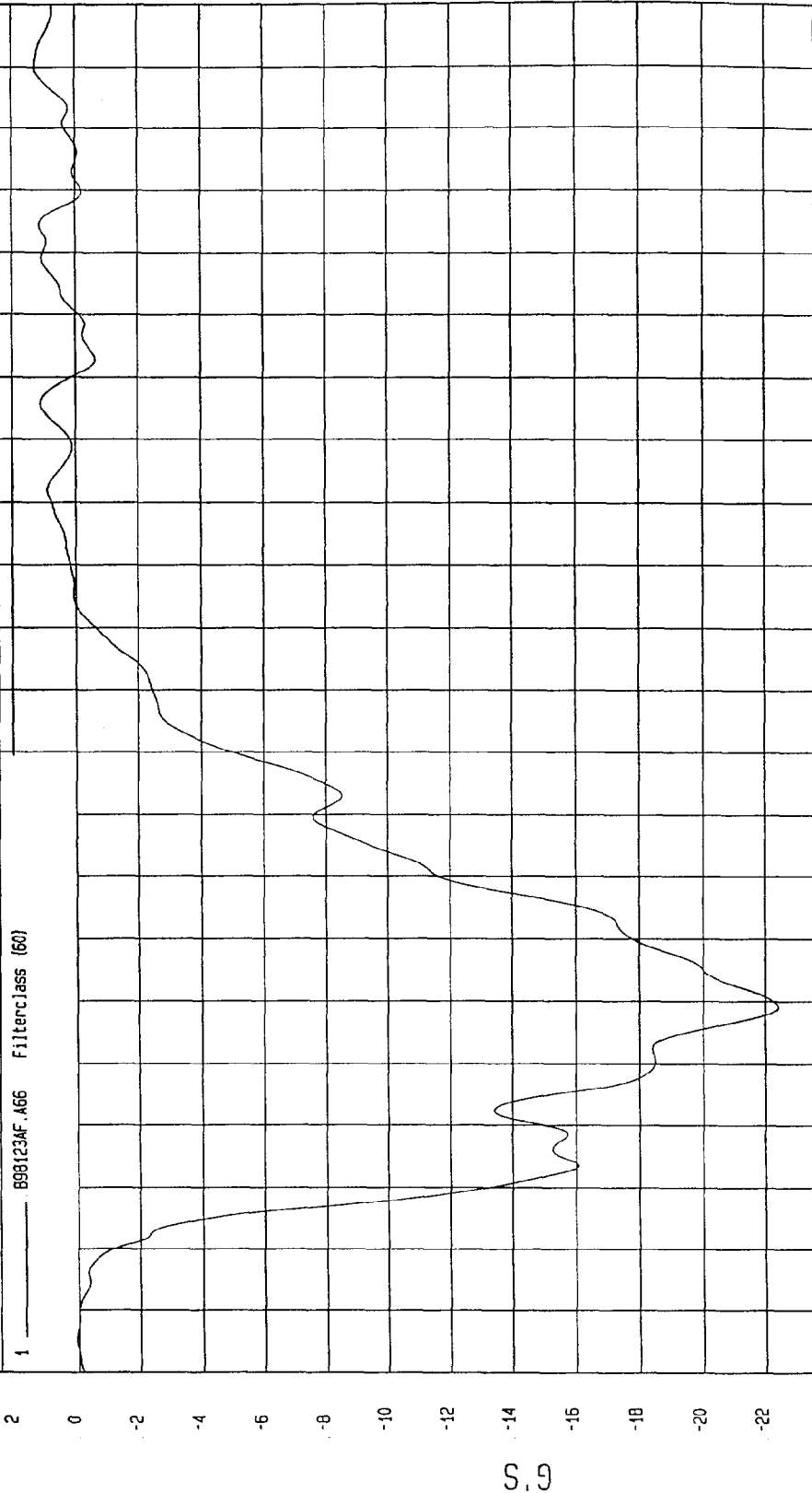
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

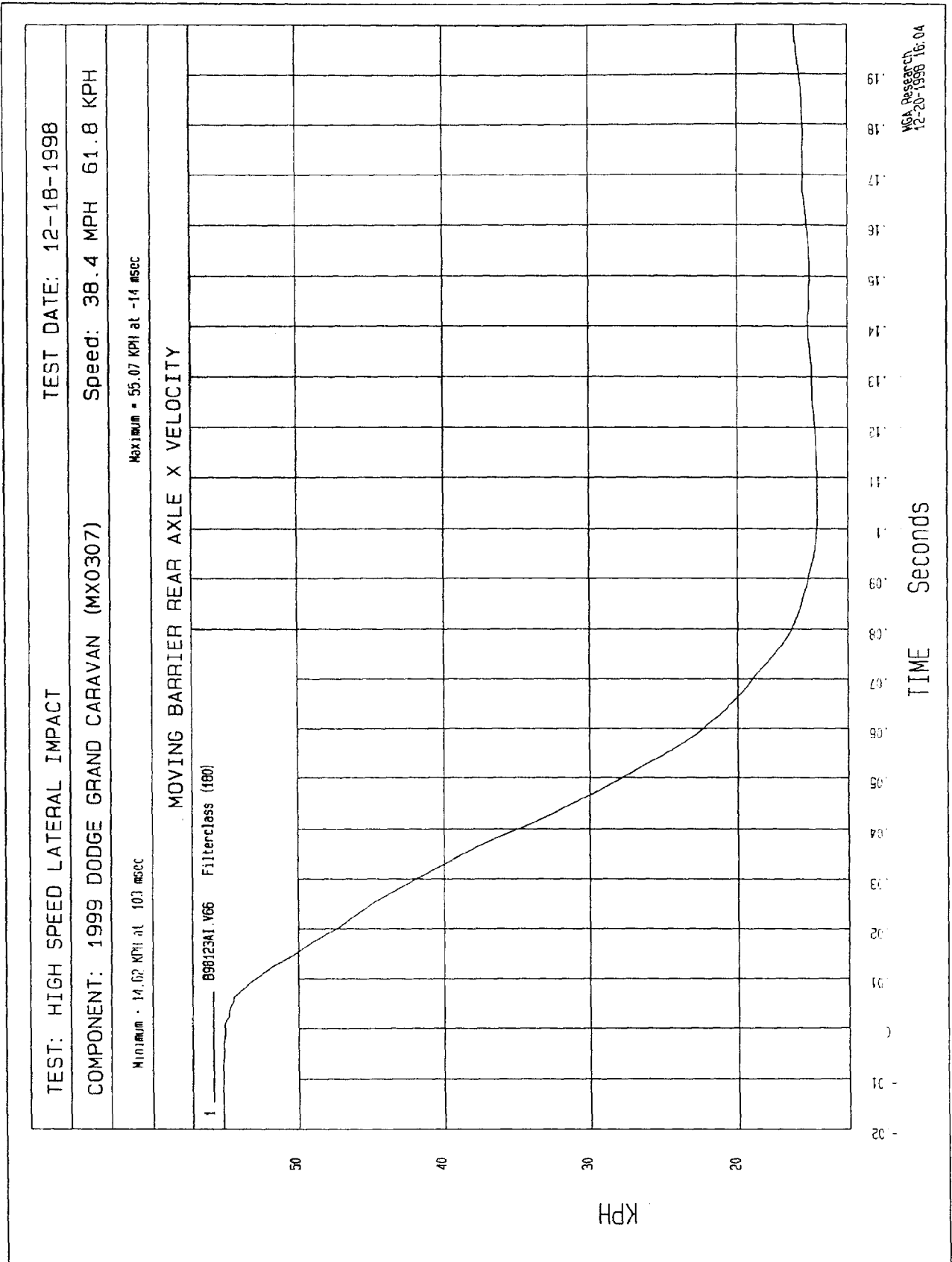
Maximum = 1.27 G'S at 190 msec

Minimum = -22.4 G'S at 39 msec

MOVING BARRIER REAR AXLE X ACCELERATION



MOA Research
12-20-1998 16:03



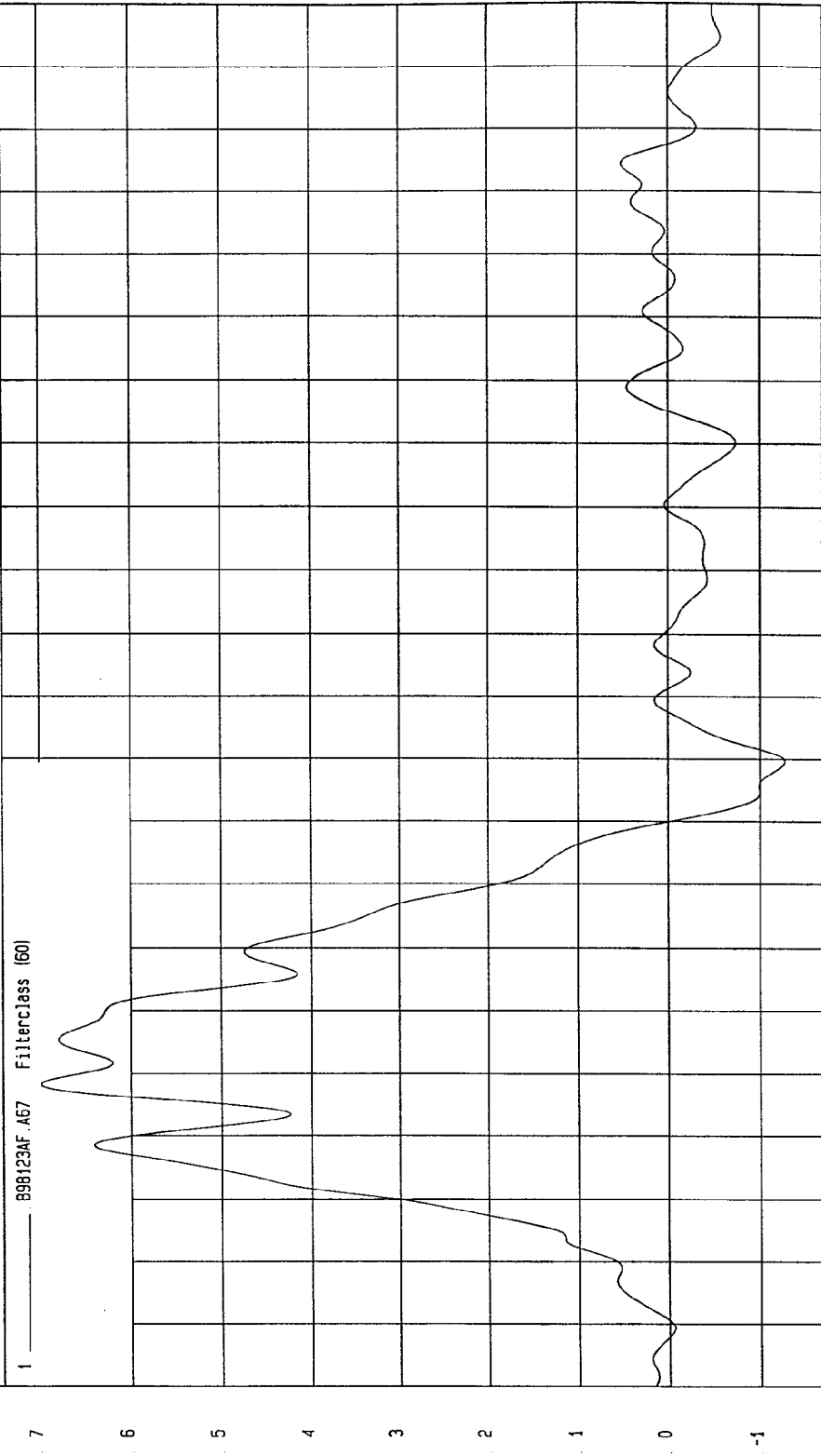
MGA Research
12-20-1998 16:04

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -1.28 G'S at 80 msec Maximum = 6.99 G'S at 28 msec

MOVING BARRIER REAR AXLE Y ACCELERATION



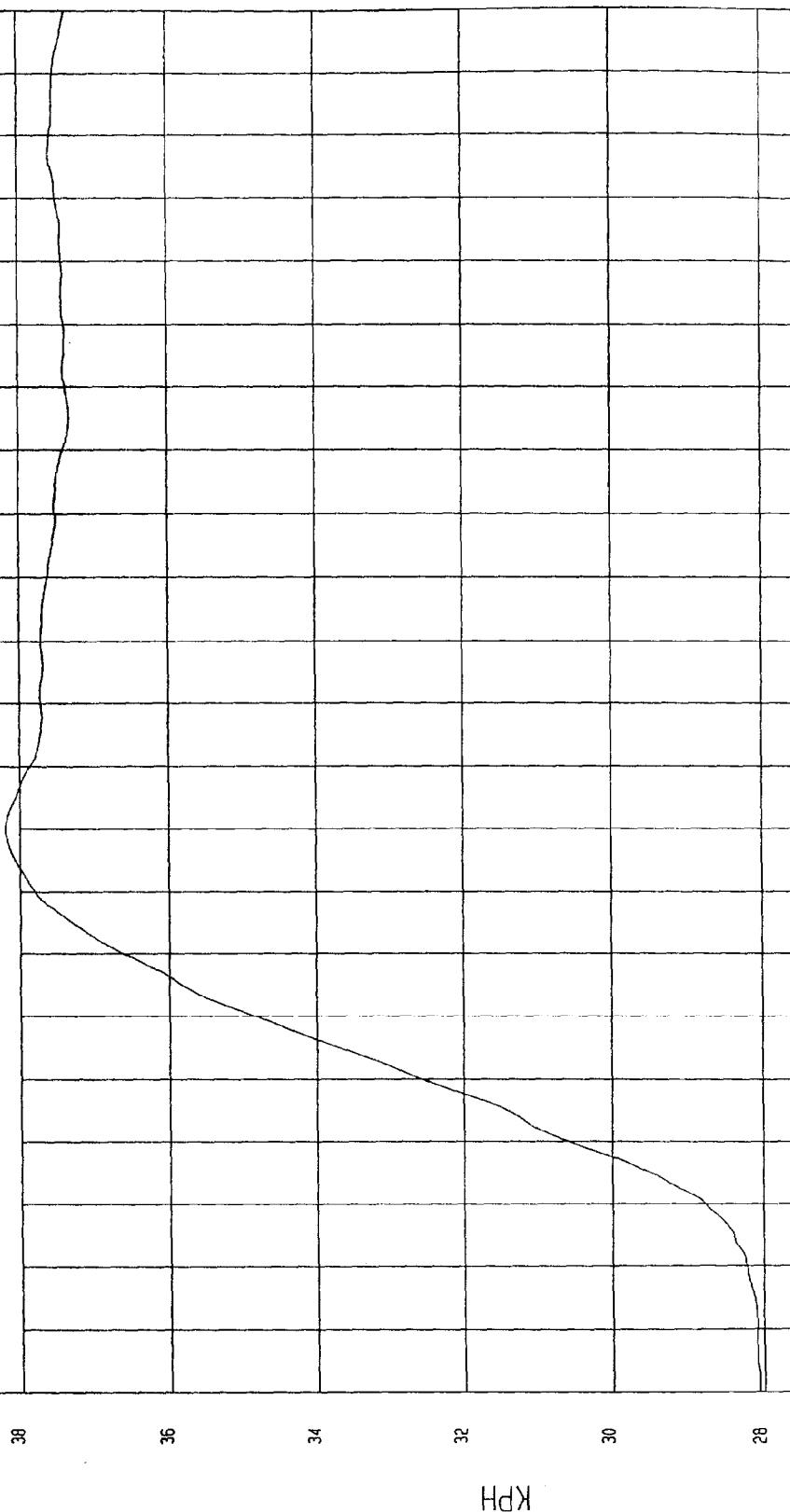
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = 28.06 KPH at -20 msec Maximum = 38.19 KPH at 70 msec

MOVING BARRIER REAR AXLE Y VELOCITY

1 898123A1.V67 Filterclass (180)



MCA Research
12-20-1998 16.04

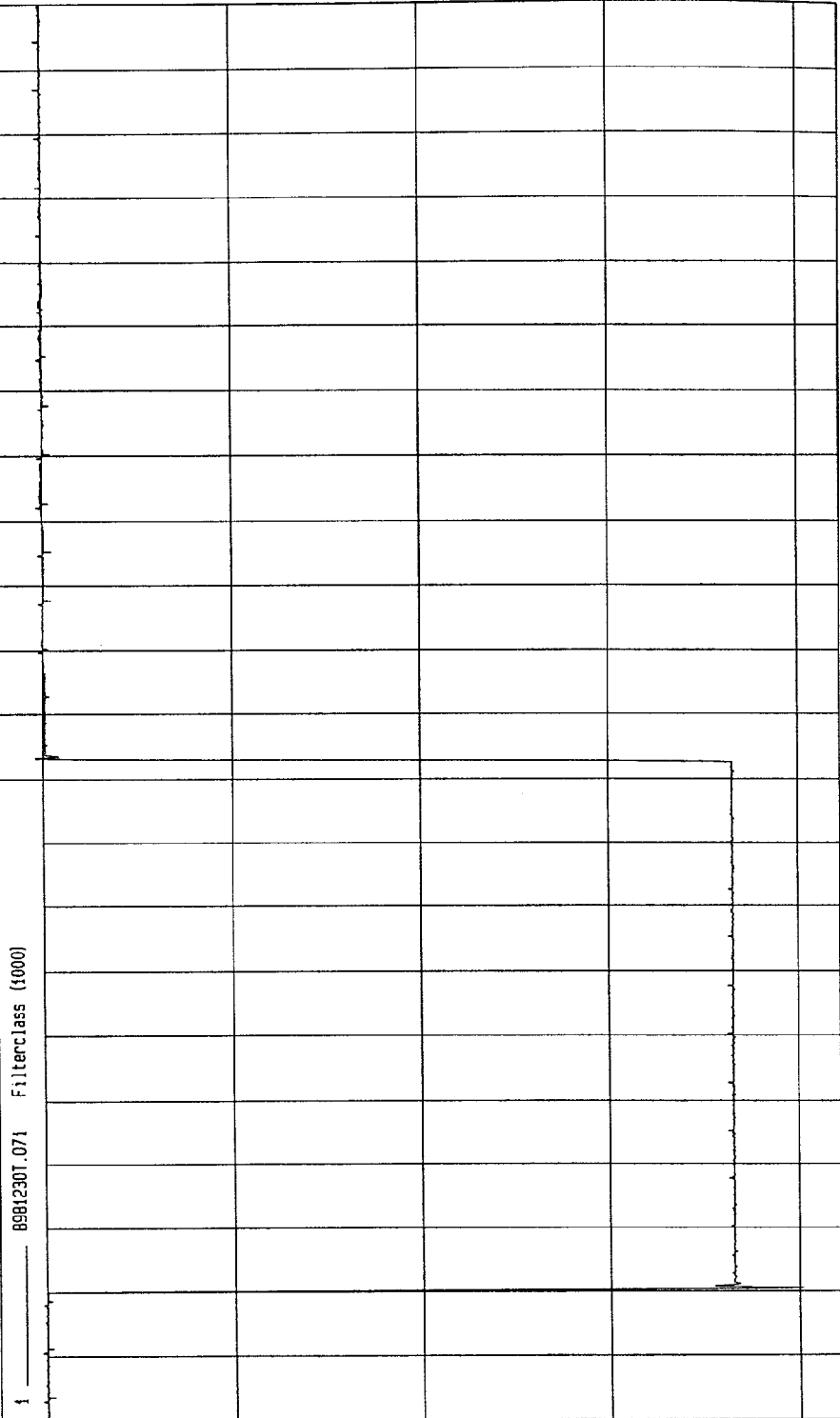
TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -4.02 VOLTS at 0 msec Maximum = 4.24E-02 VOLTS at 83 msec

LEFT BARRIER CONTACT



TIME (SECONDS)

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.1 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

WCA Research
12-20-1998 16:04

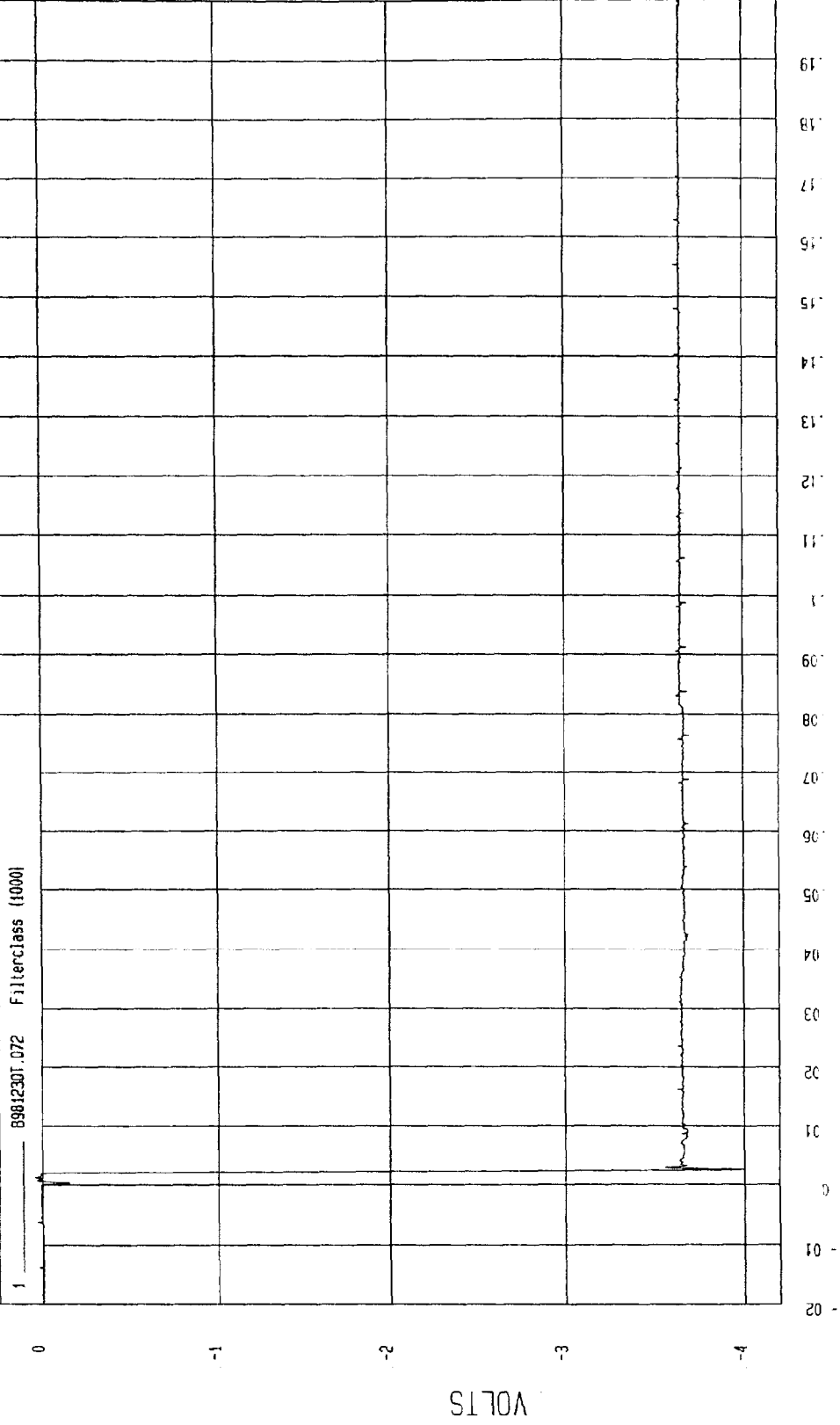
VOLTS

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -4 VOLTS at 2 msec Maximum = 4.21E-02 VOLTS at 1 msec

RIGHT BARRIER CONTACT



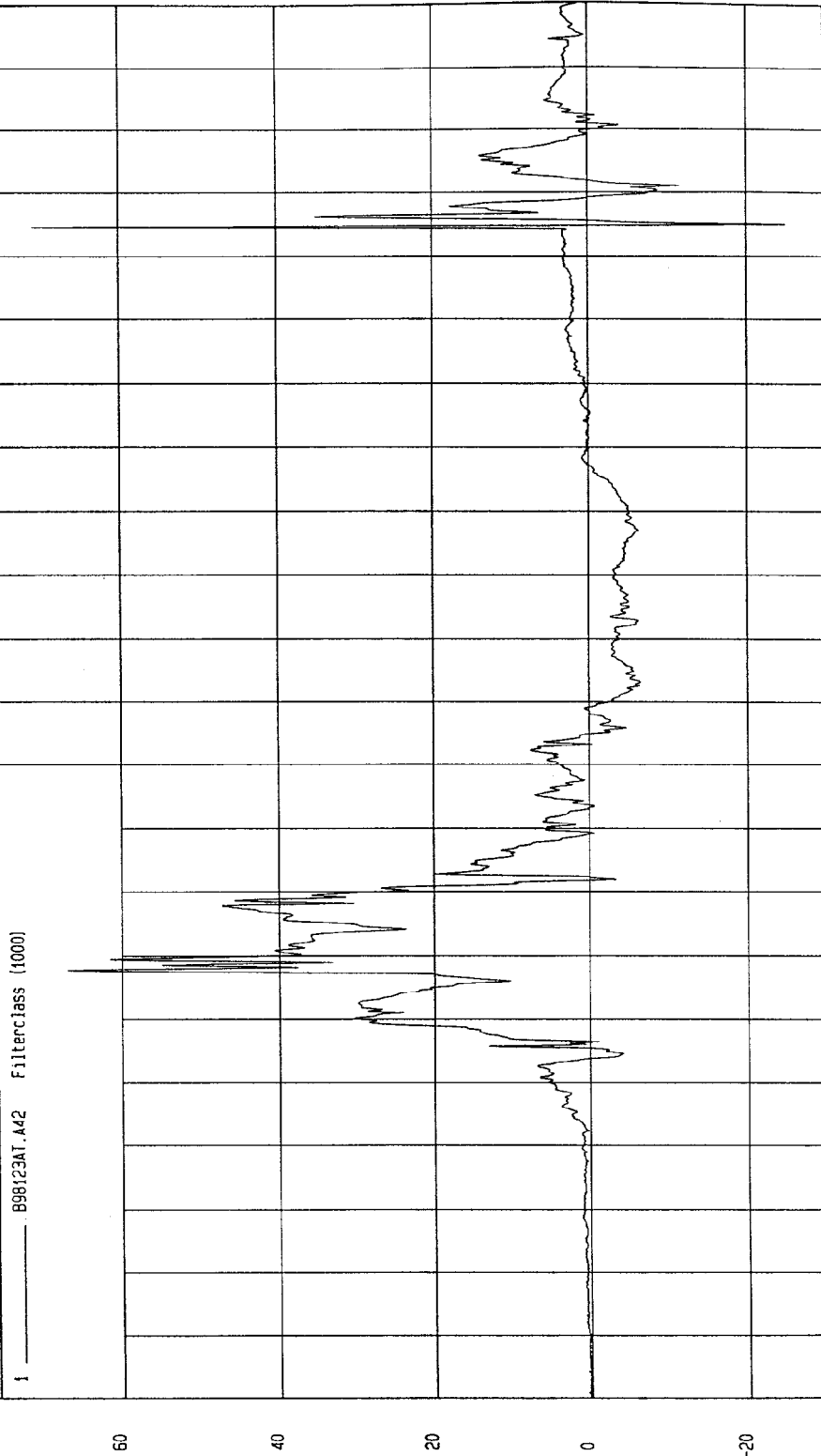
MGA Research
12-20-1998 15:04

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -24.91 G'S at 165 msec Maximum = 70.86 G'S at 164 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



MSA Research
12-20-1998 15:50

TIME (SECONDS)

G

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 34.97 KPH at 200 msec

Minimum = 0 KPH at -20 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

1 B98123A1.V42 Filterclass (180)



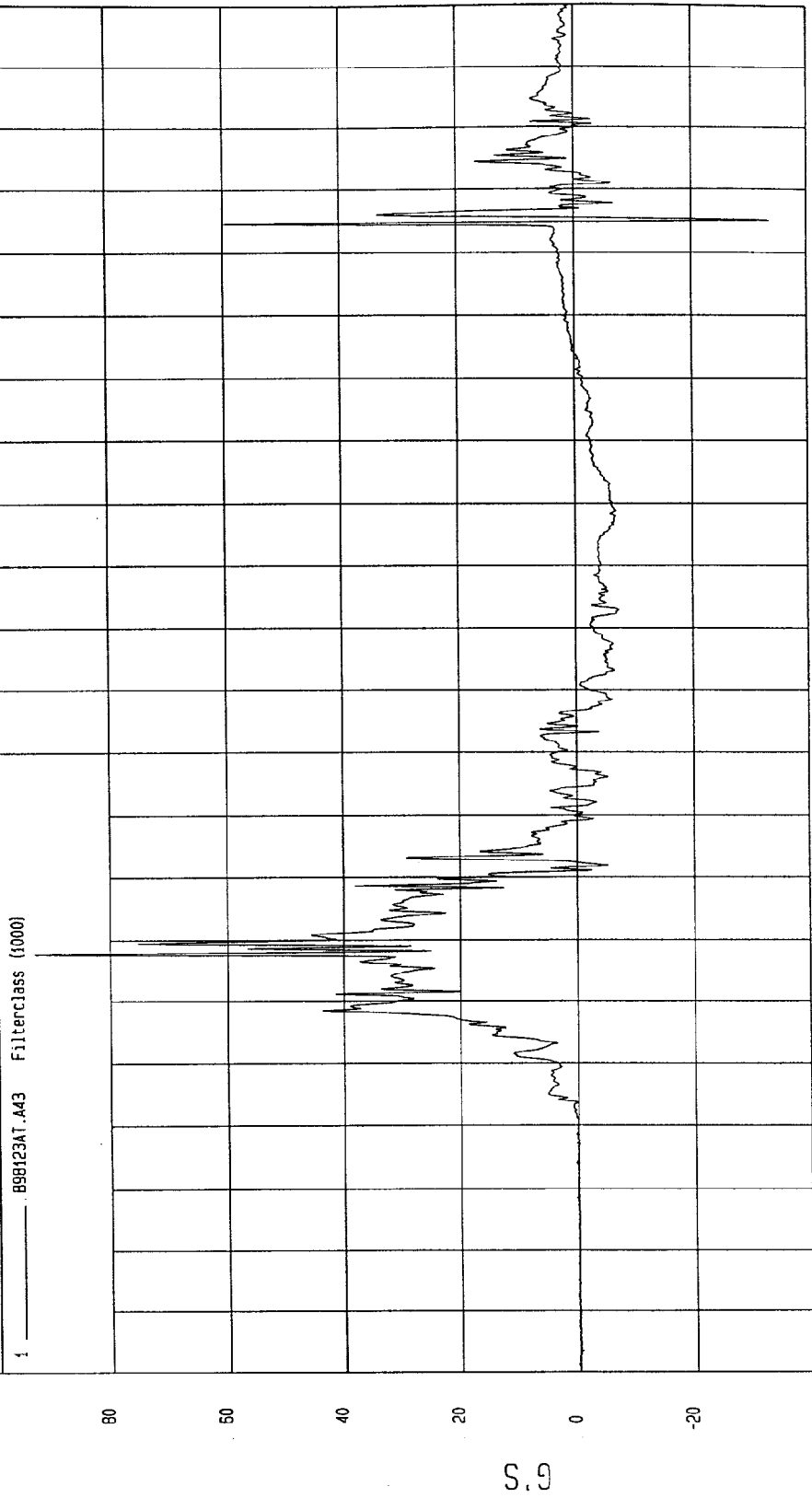
MCA Research
12-20-1998 15:49

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -33.29 G'S at 165 msec Maximum = 92.62 G'S at 48 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION



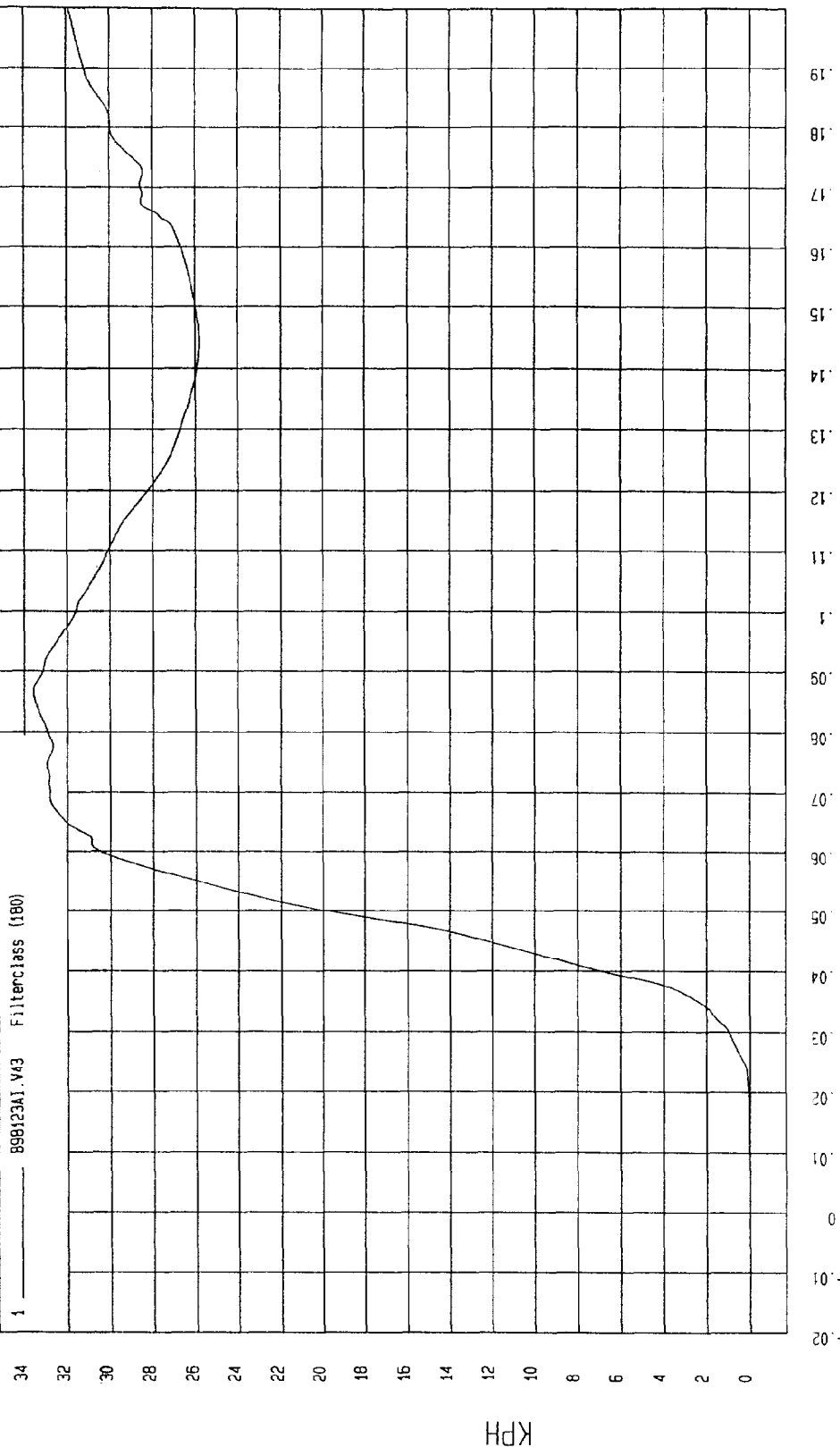
MECA Research
12-20-1998 15:50

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.69E-03 KPH at -9 msec Maximum = 33.57 KPH at 87 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY



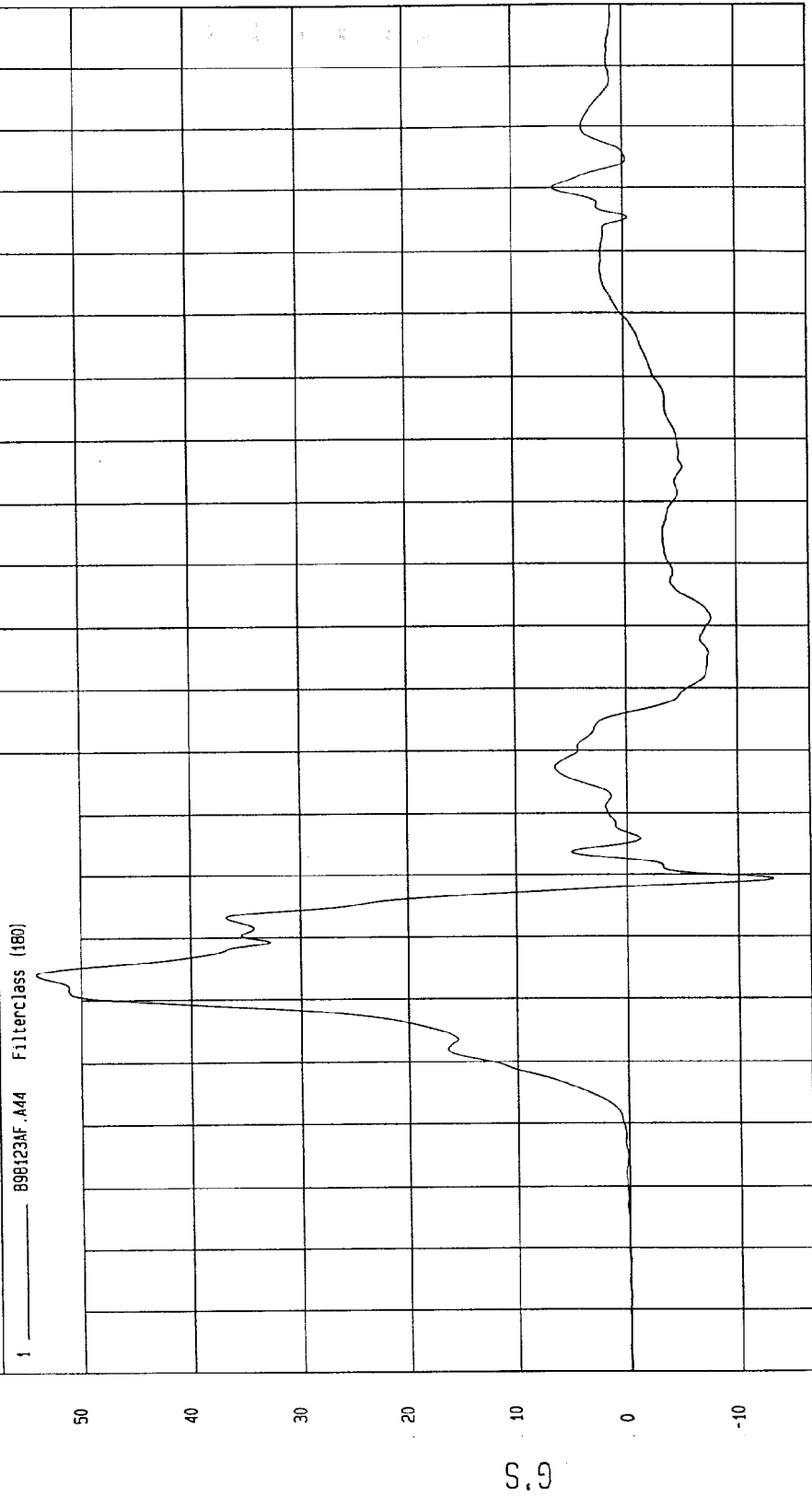
MGA Research
12-20-1998 15.49

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -13.18 G'S at 59 msec Maximum = 54.06 G'S at 44 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION



MGA Research
12-20-1998 15:50

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

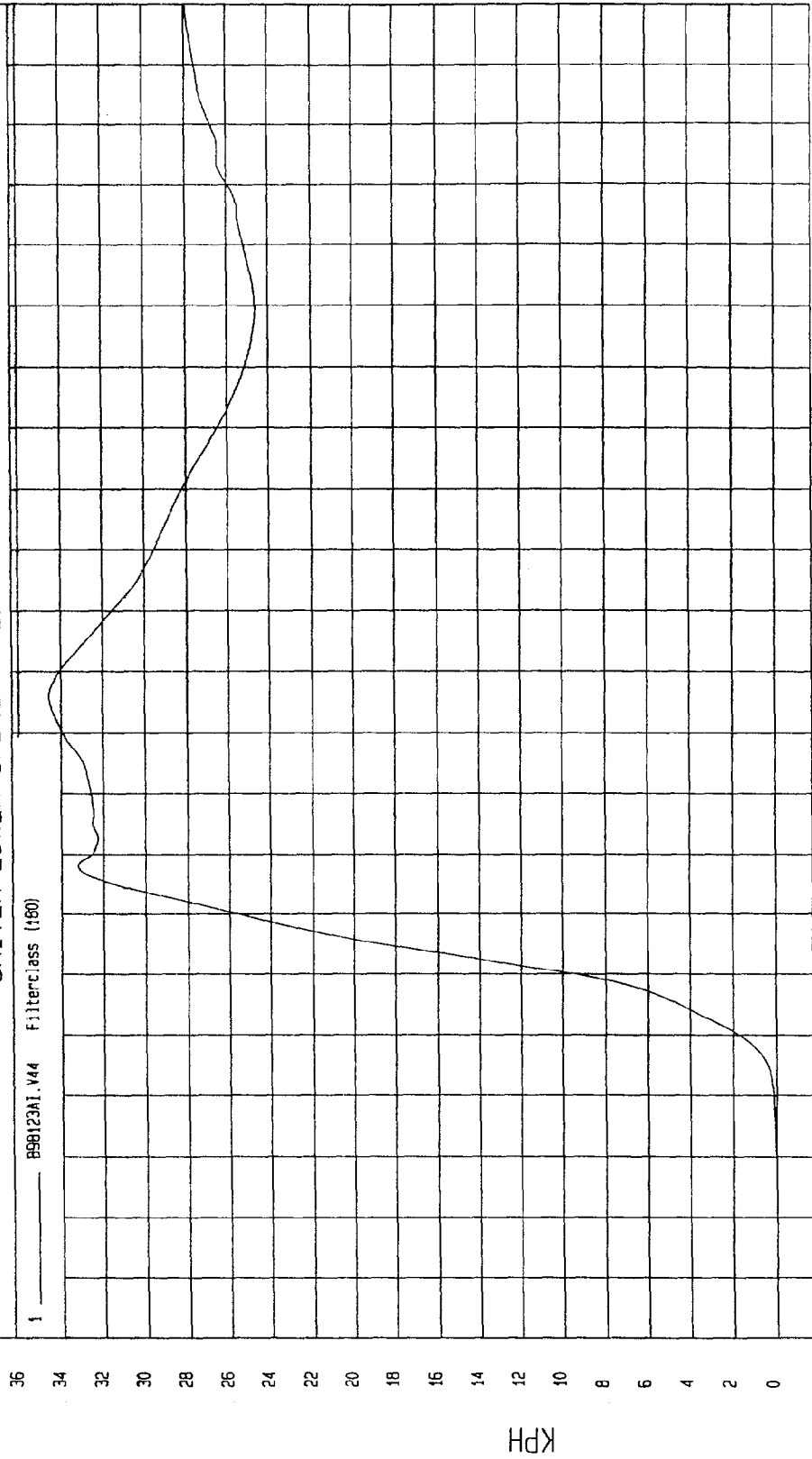
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 34.57 KPH at 86 msec

Minimum = -2.71E-03 KPH at -18 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 _____ B50123A1.V44 FilterClass (180)



TIME Seconds

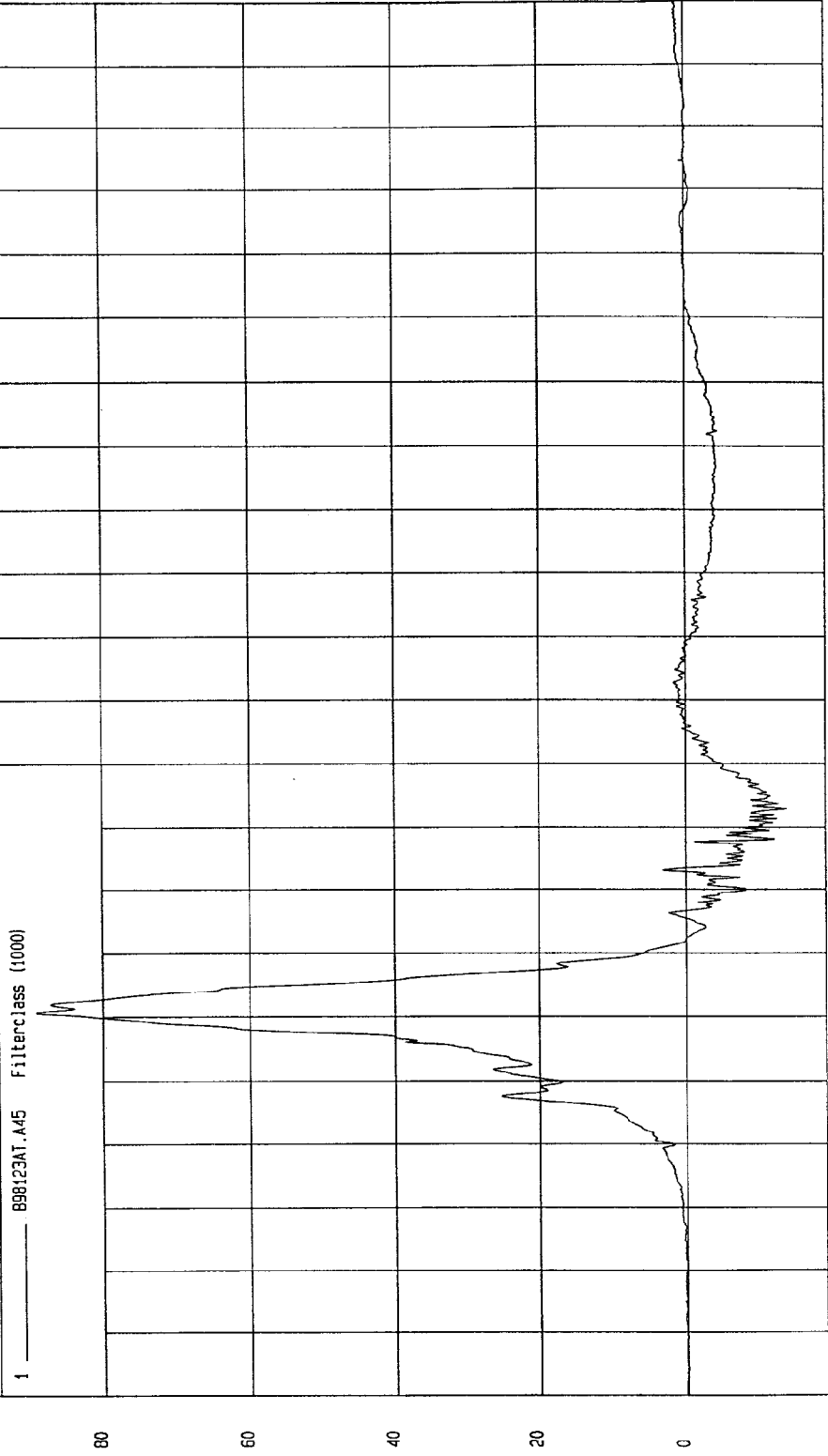
MCA Research
12-20-1998 15:49

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

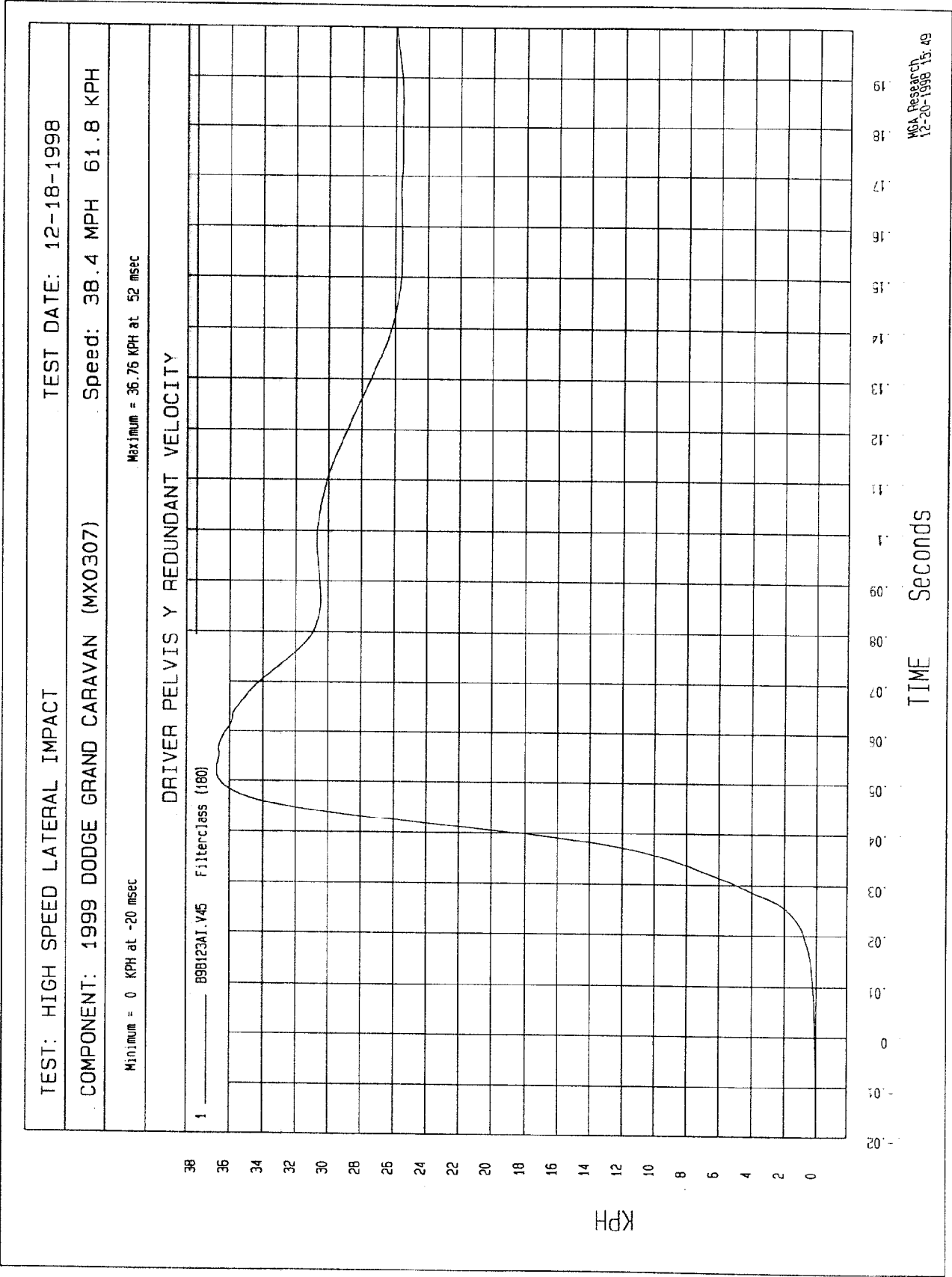
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

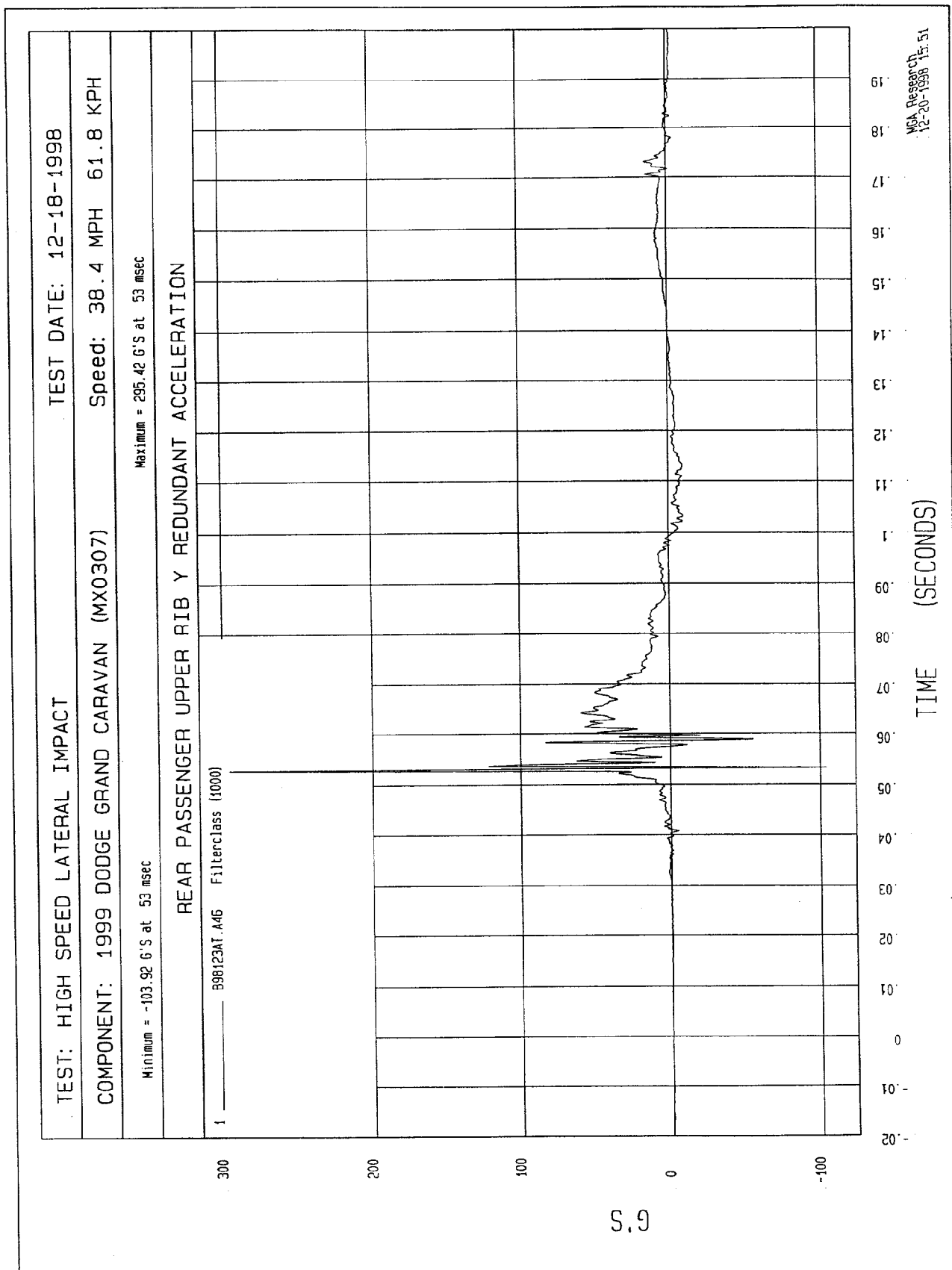
Minimum = -13.81 G'S at 73 msec Maximum = 89.08 G'S at 41 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



NSA Research
12-20-1998 15:51



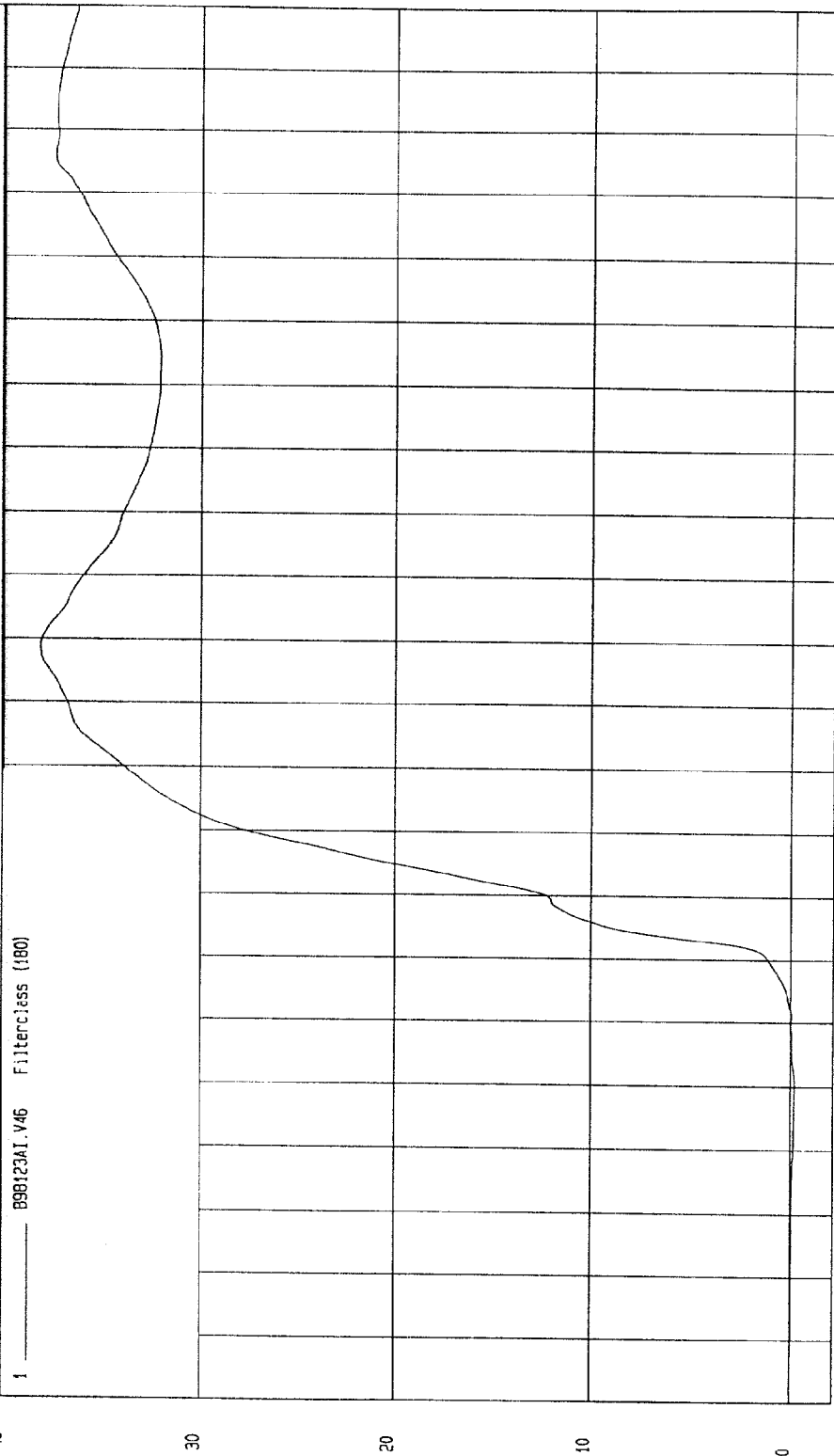


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = .2 KPH at 30 msec Maximum = 38.15 KPH at 99 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY



MOA Research
12-20-1998 15:49

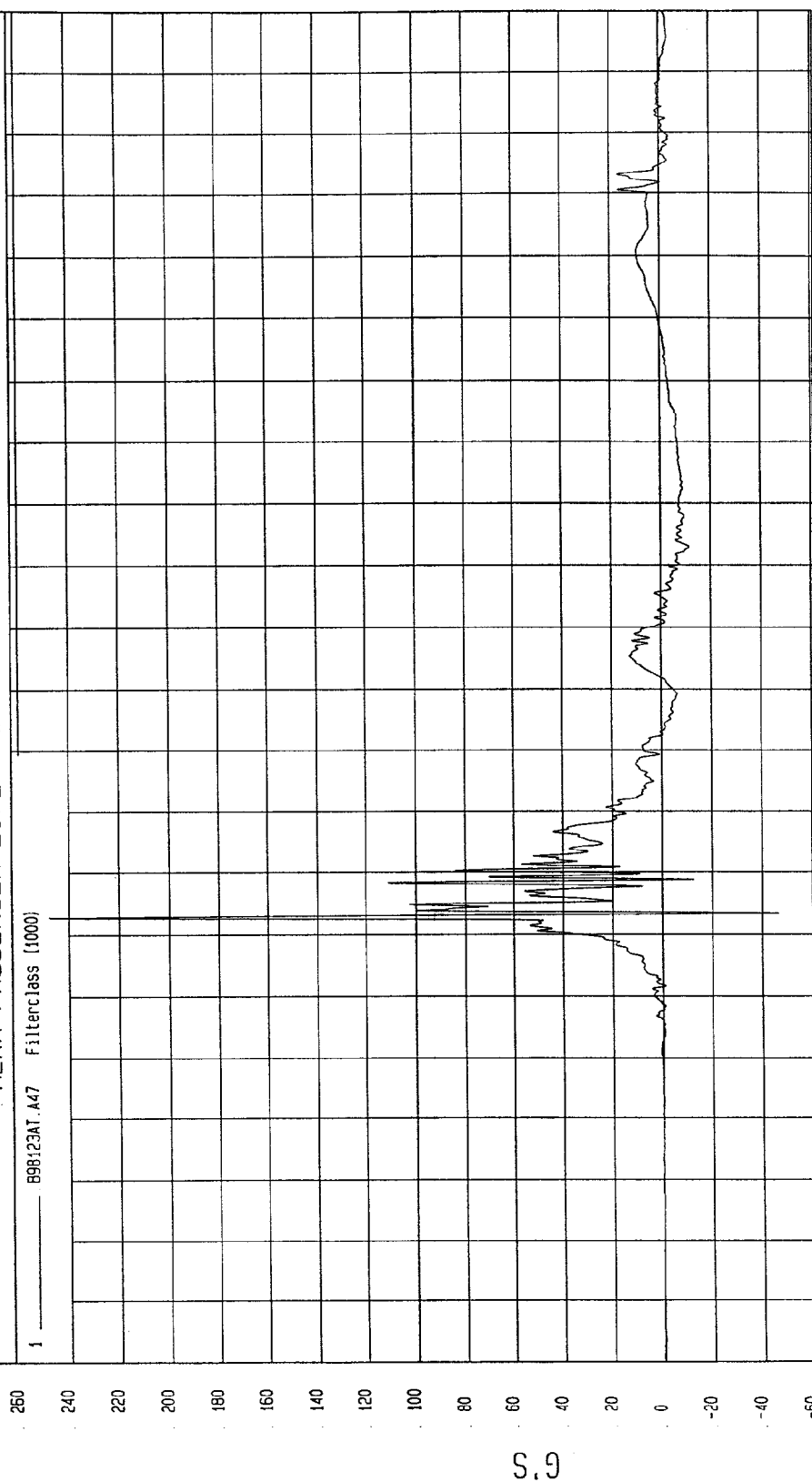
TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

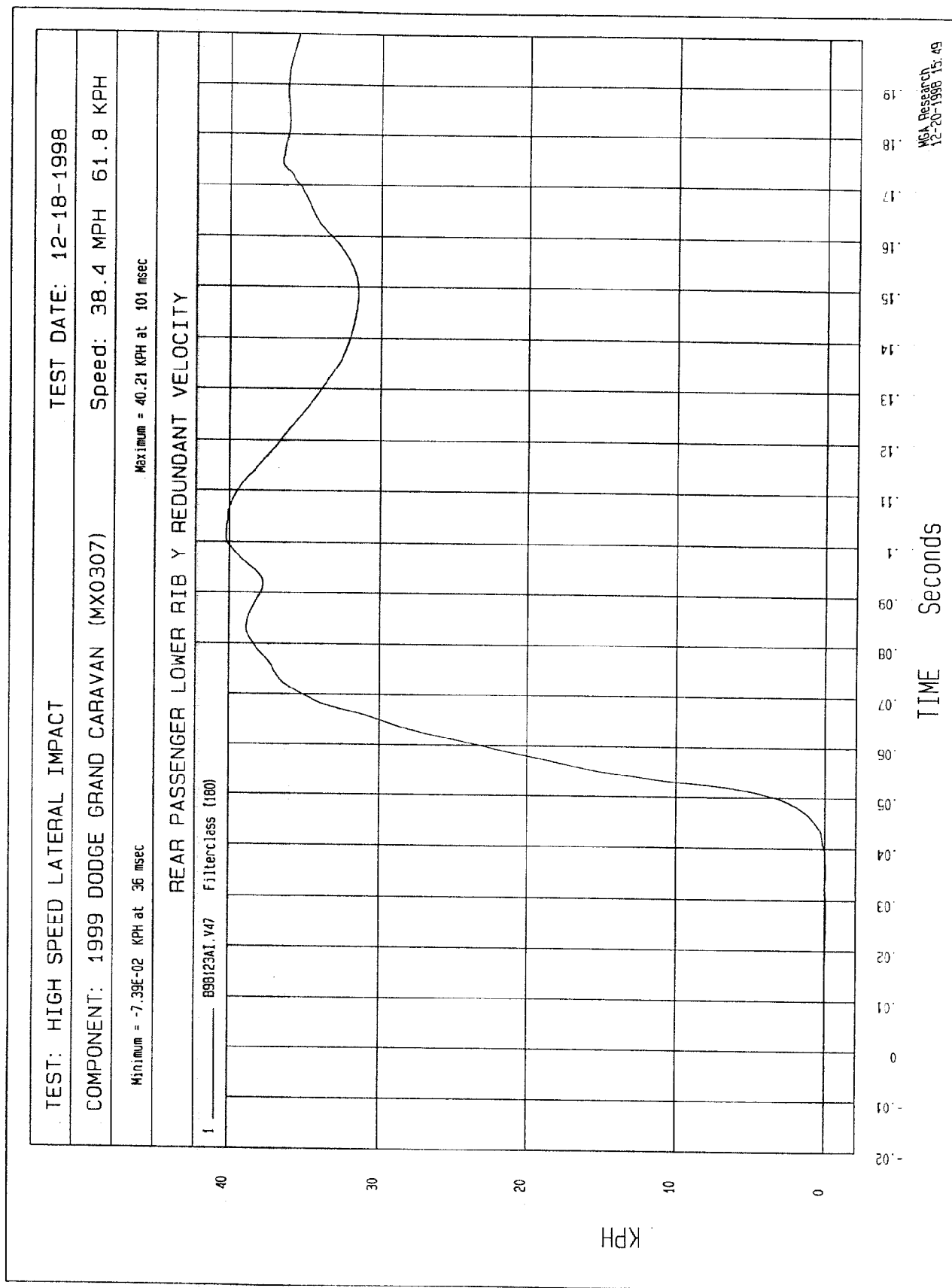
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -46.35 G'S at 53 msec Maximum = 247.94 G'S at 53 msec

PEAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION



MGA Research
12-20-1998 15:51

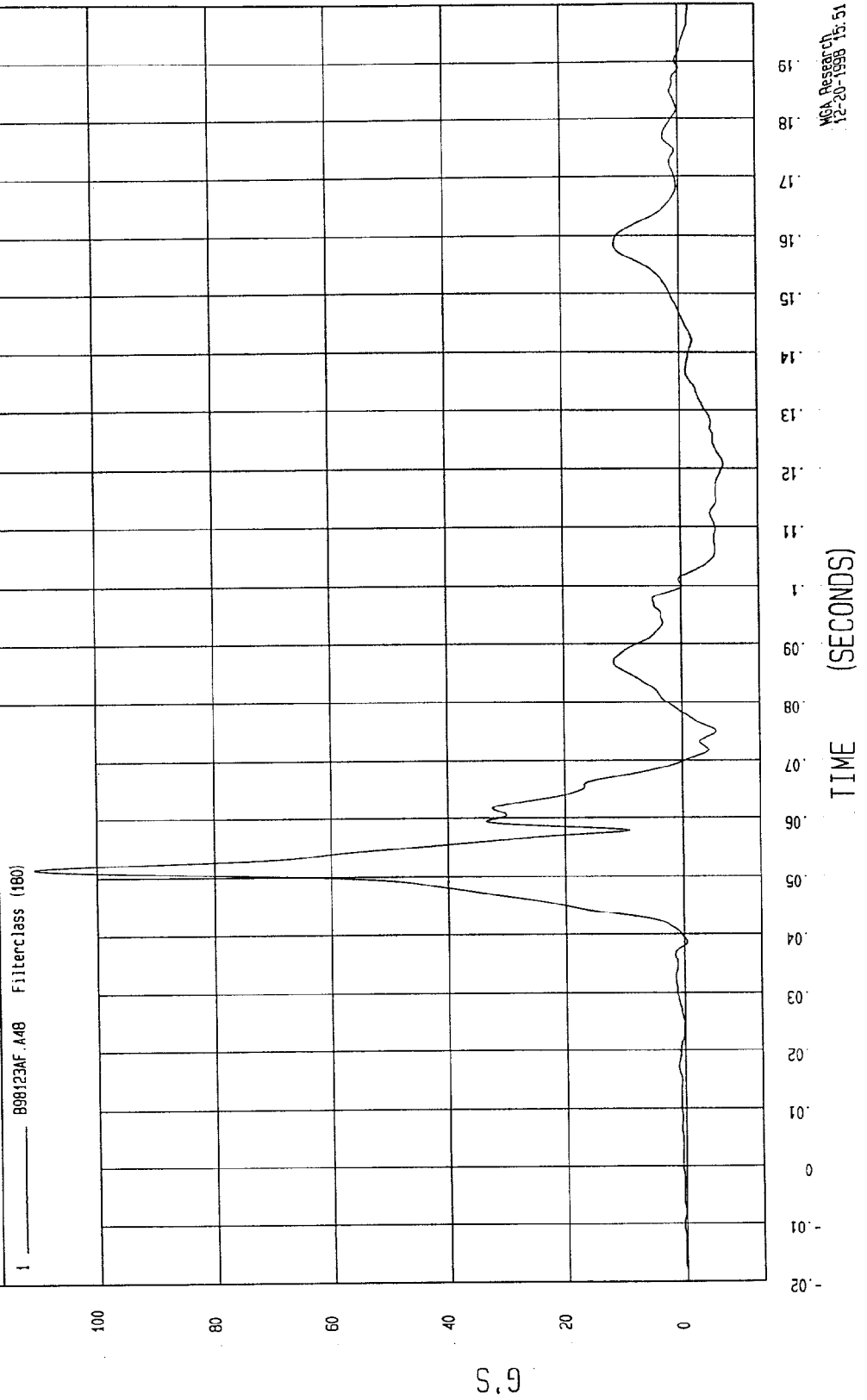


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

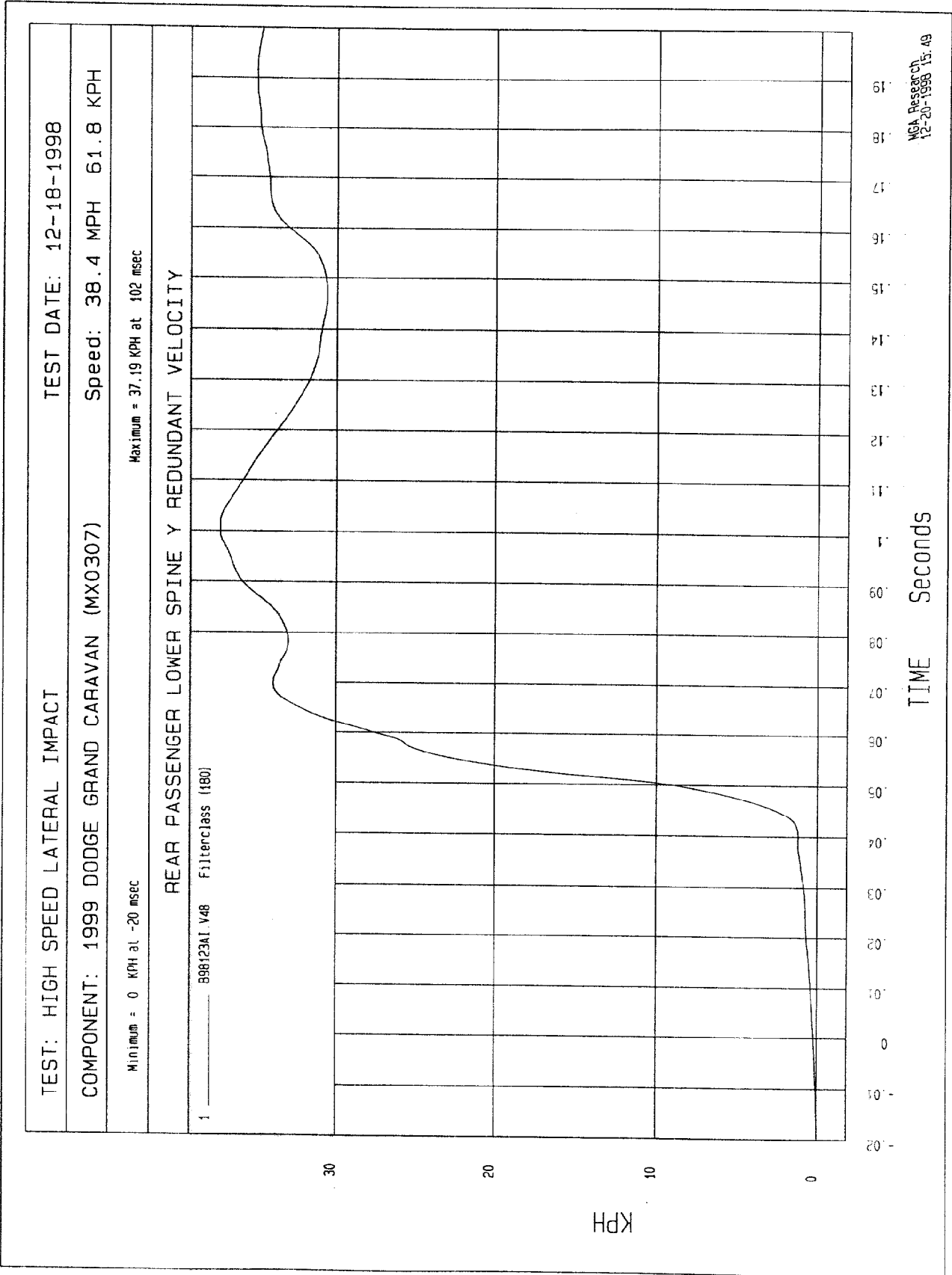
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -7.29 G'S at 121 msec Maximum = 110.8 G'S at 52 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



MCA Research
12-20-1998 15:51

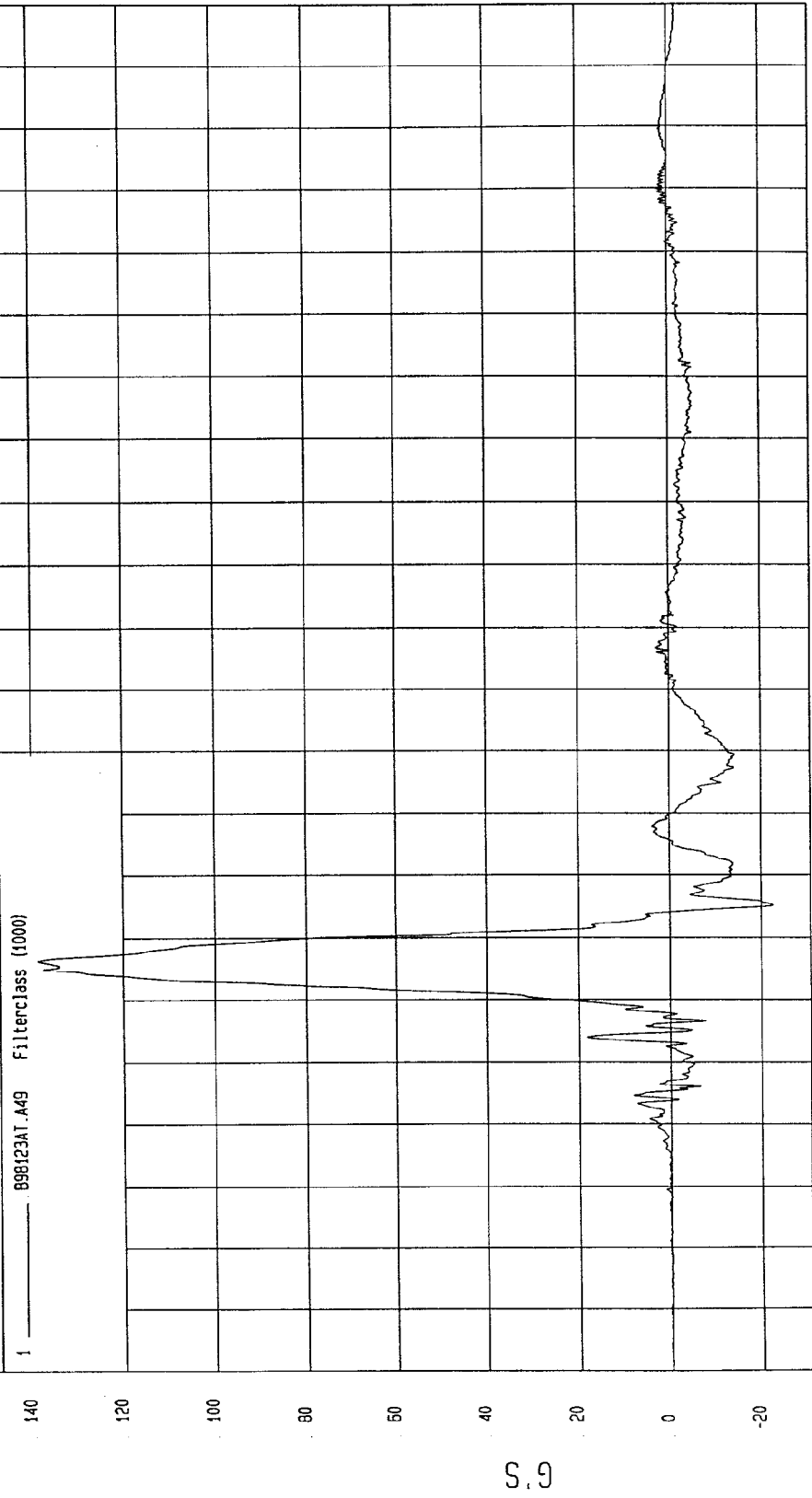


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -22.64 G'S at 55 msec Maximum = 138.86 G'S at 46 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION



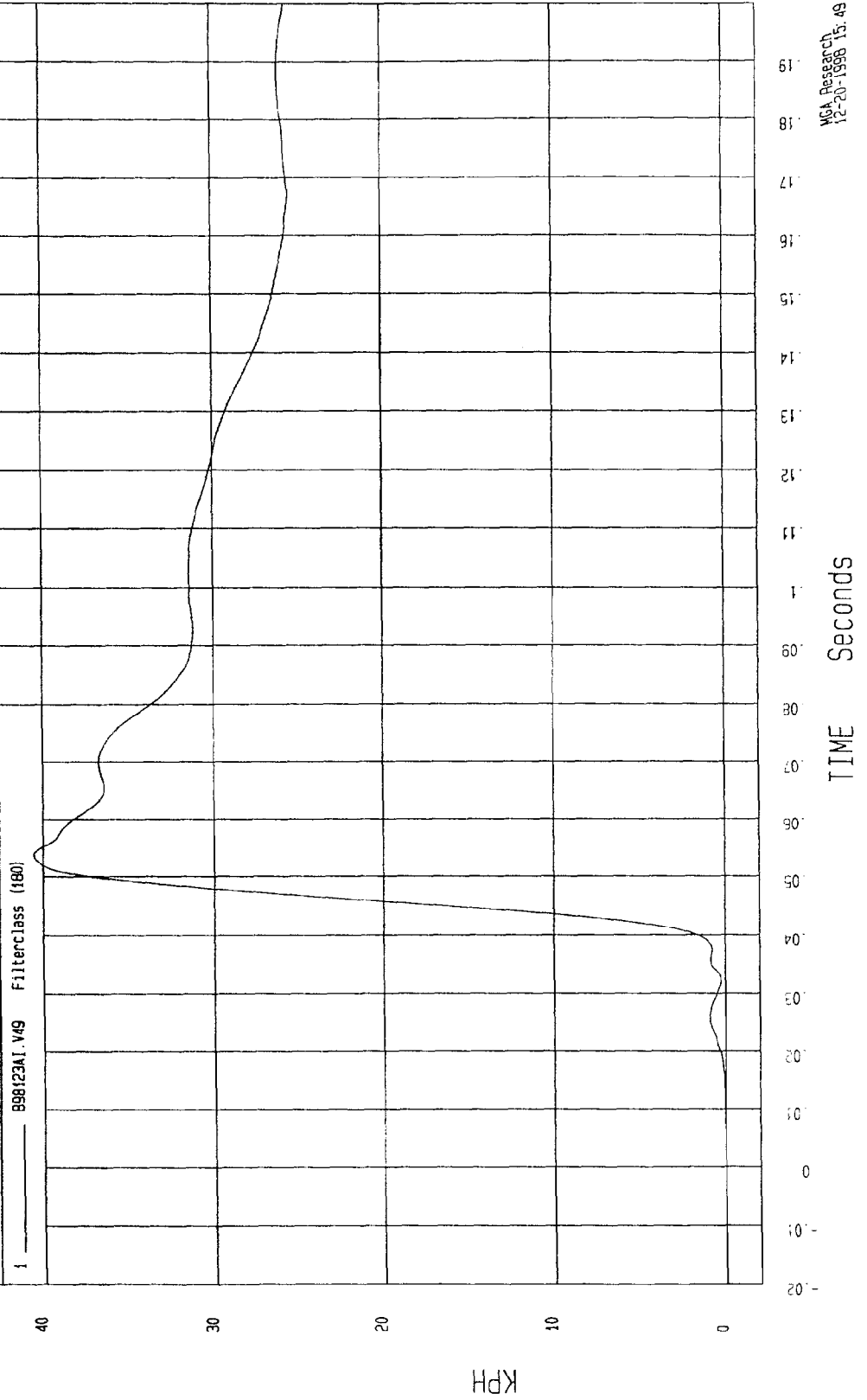
MSA Research
12-20-1998 15:51

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.46E-03 KPH at -18 msec Maximum = 40.55 KPH at 54 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

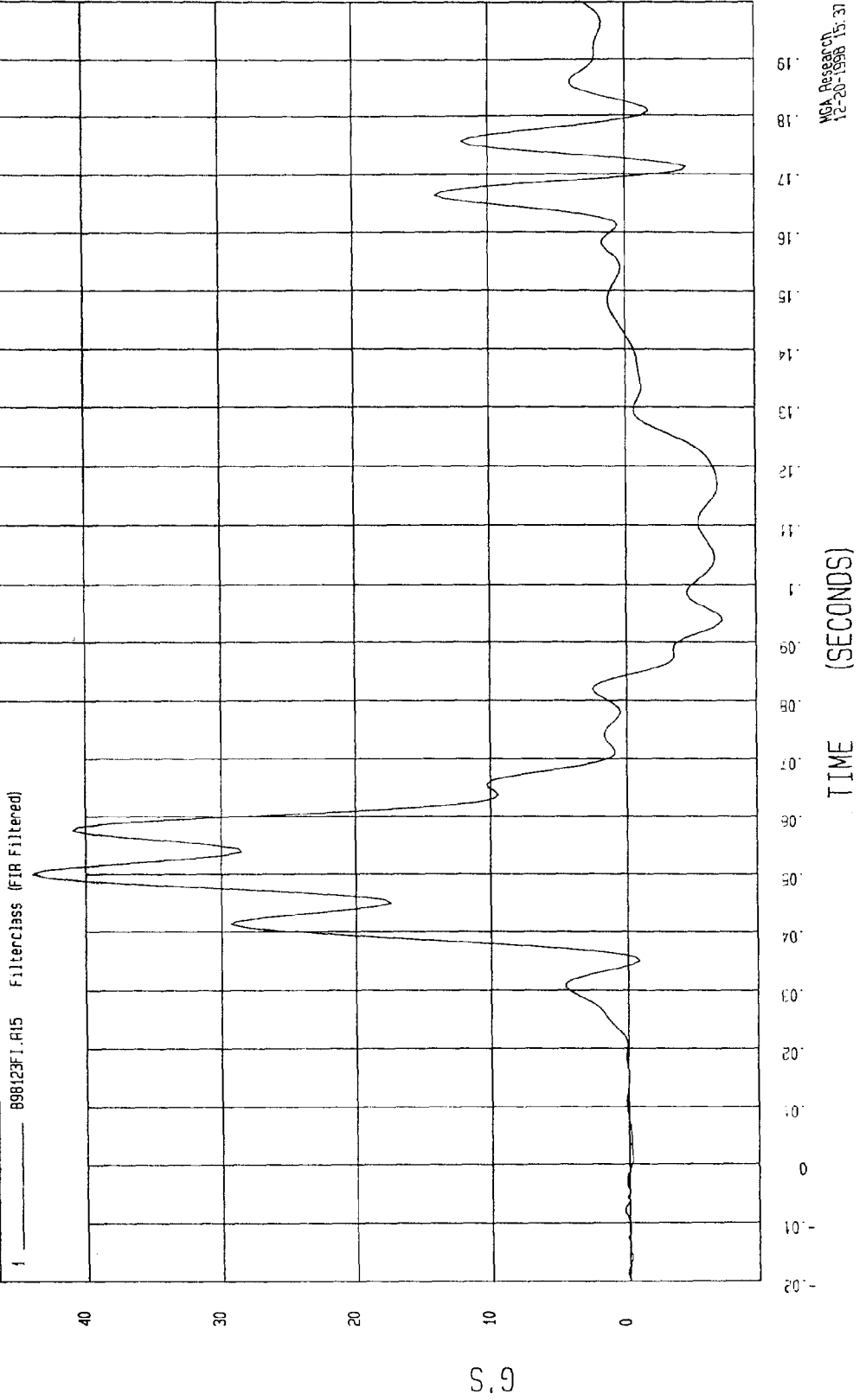


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.92 G'S at 94 msec Maximum = 43.95 G'S at 50 msec

DRIVER UPPER RIB Y ACCELERATION

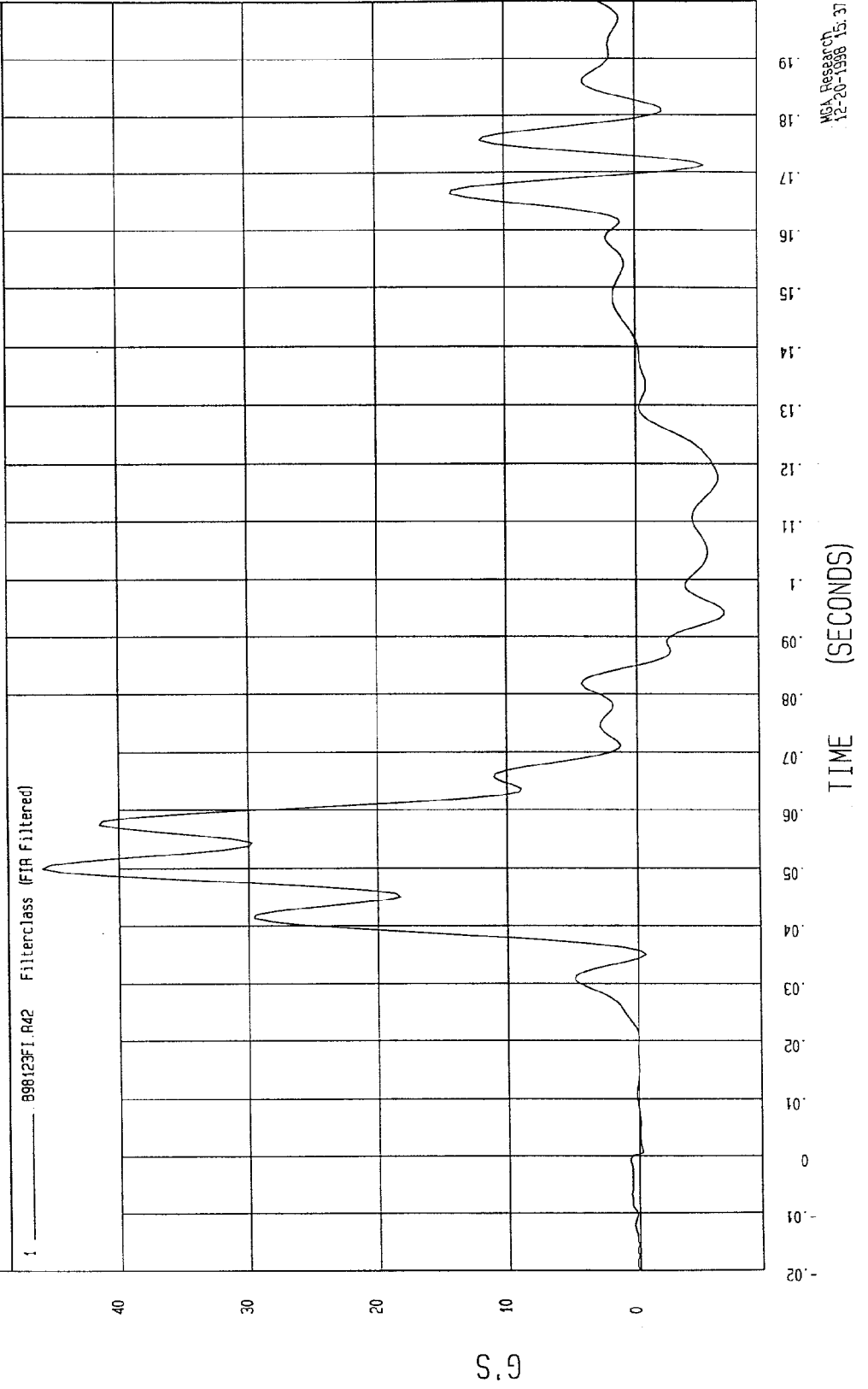


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.73 G'S at 94 msec Maximum = 45.87 G'S at 50 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

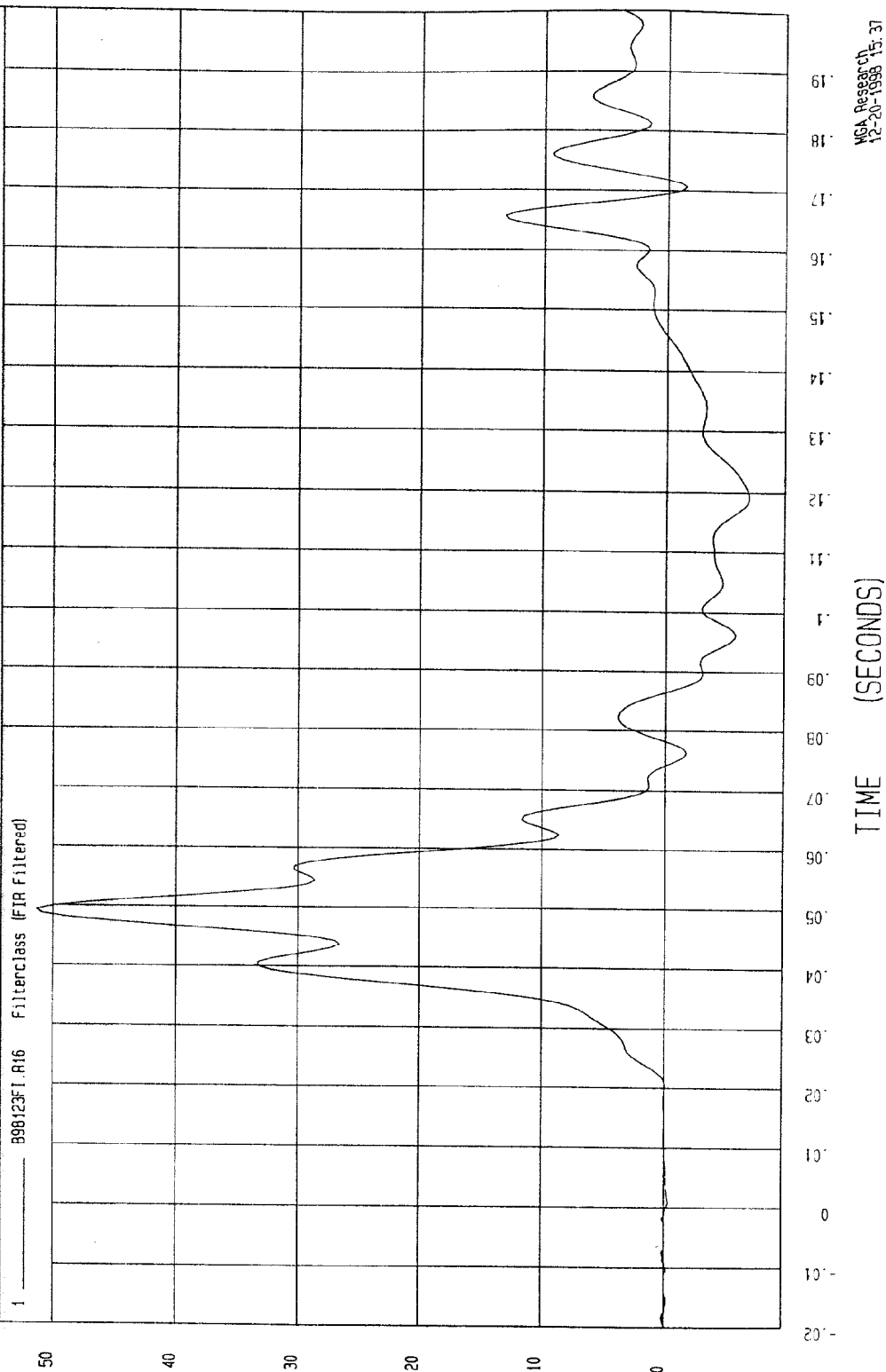


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

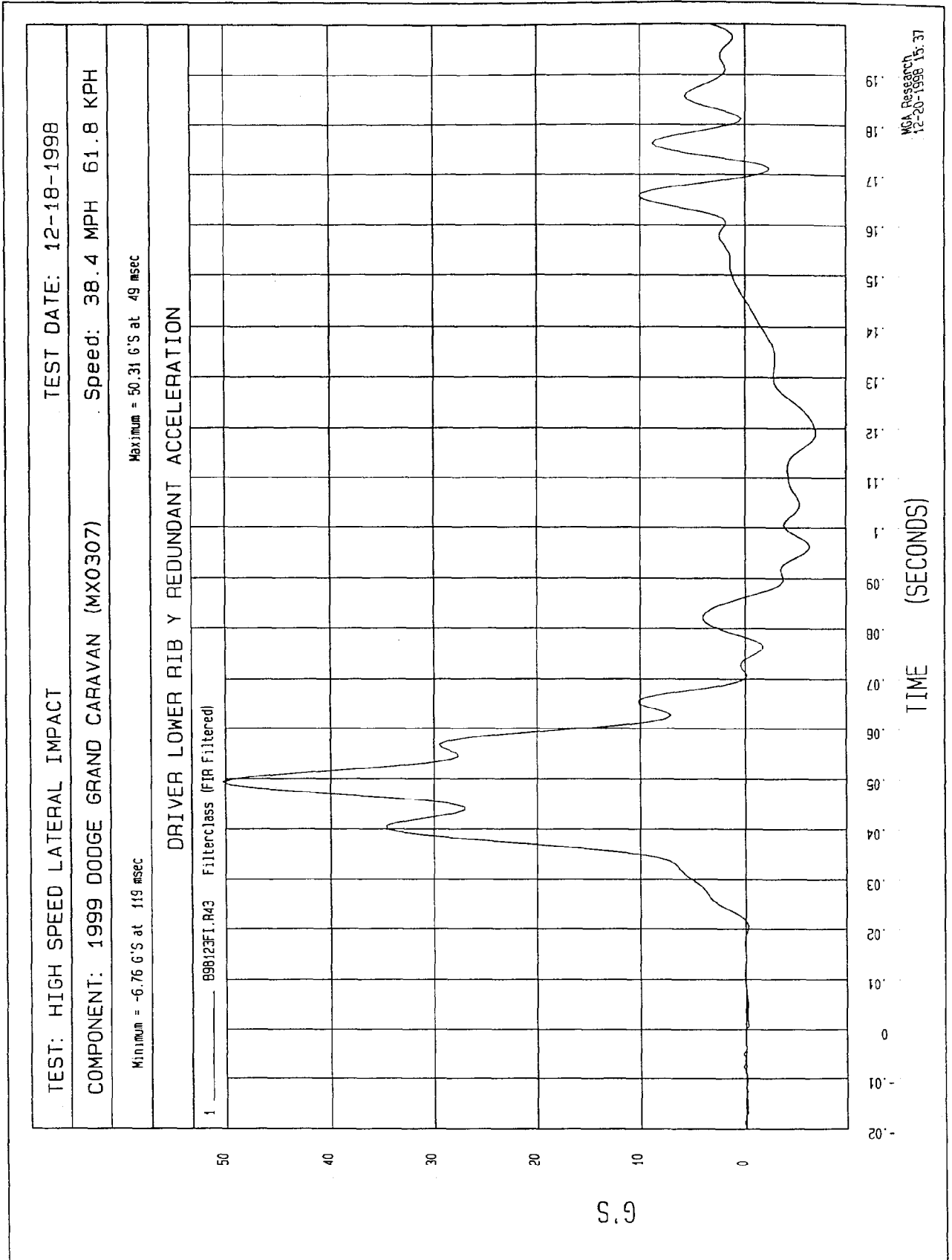
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -6.61 G'S at 119 msec Maximum = 51.32 G'S at 49 msec

DRIVER LOWER RIB Y ACCELERATION



S.G

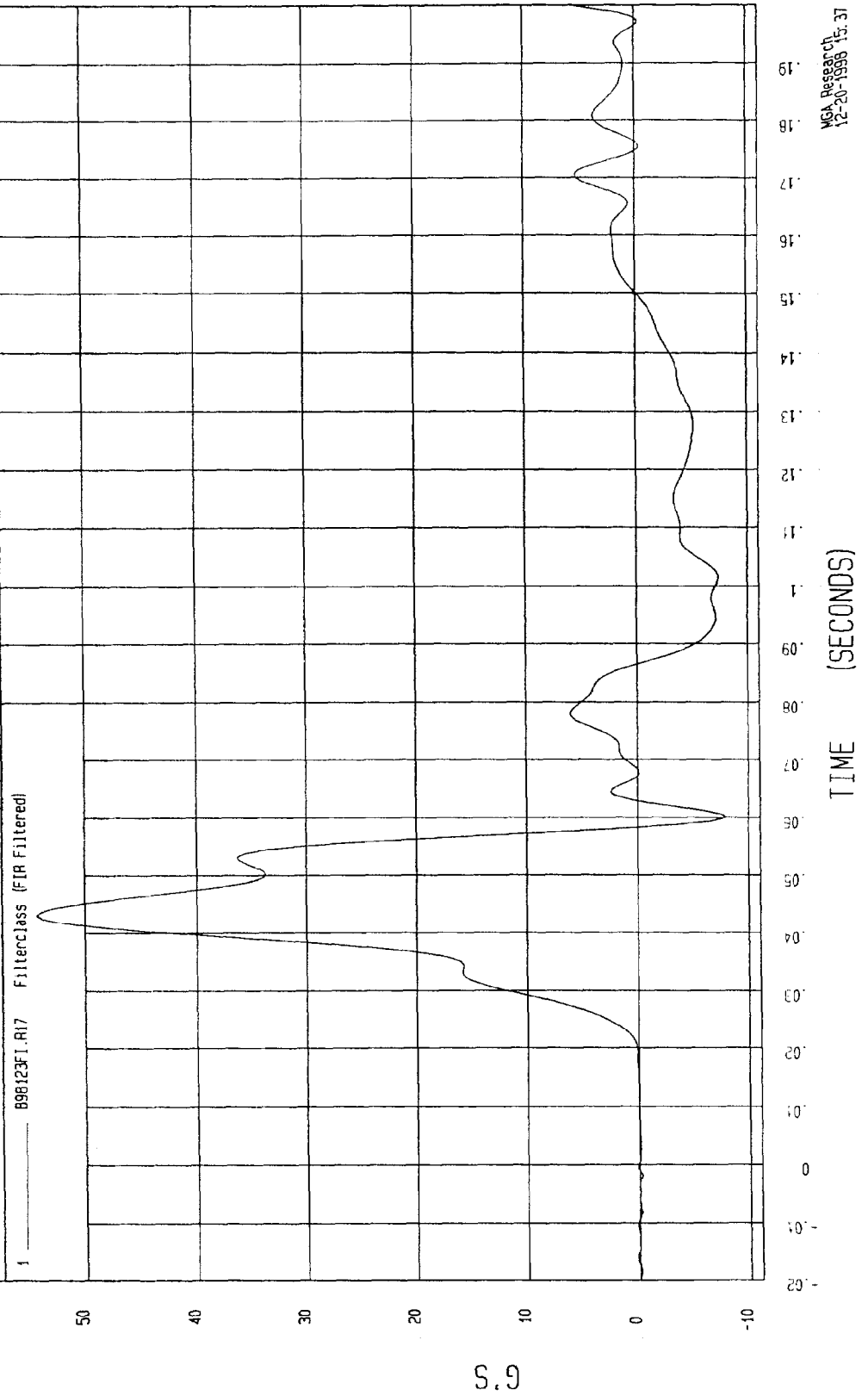


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -7.94 G'S at 60 msec Maximum = 54.18 G'S at 43 msec

DRIVER LOWER SPINE Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

Speed: 38.4 MPH 61.8 KPH

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Maximum = 54.19 G'S at 43 msec

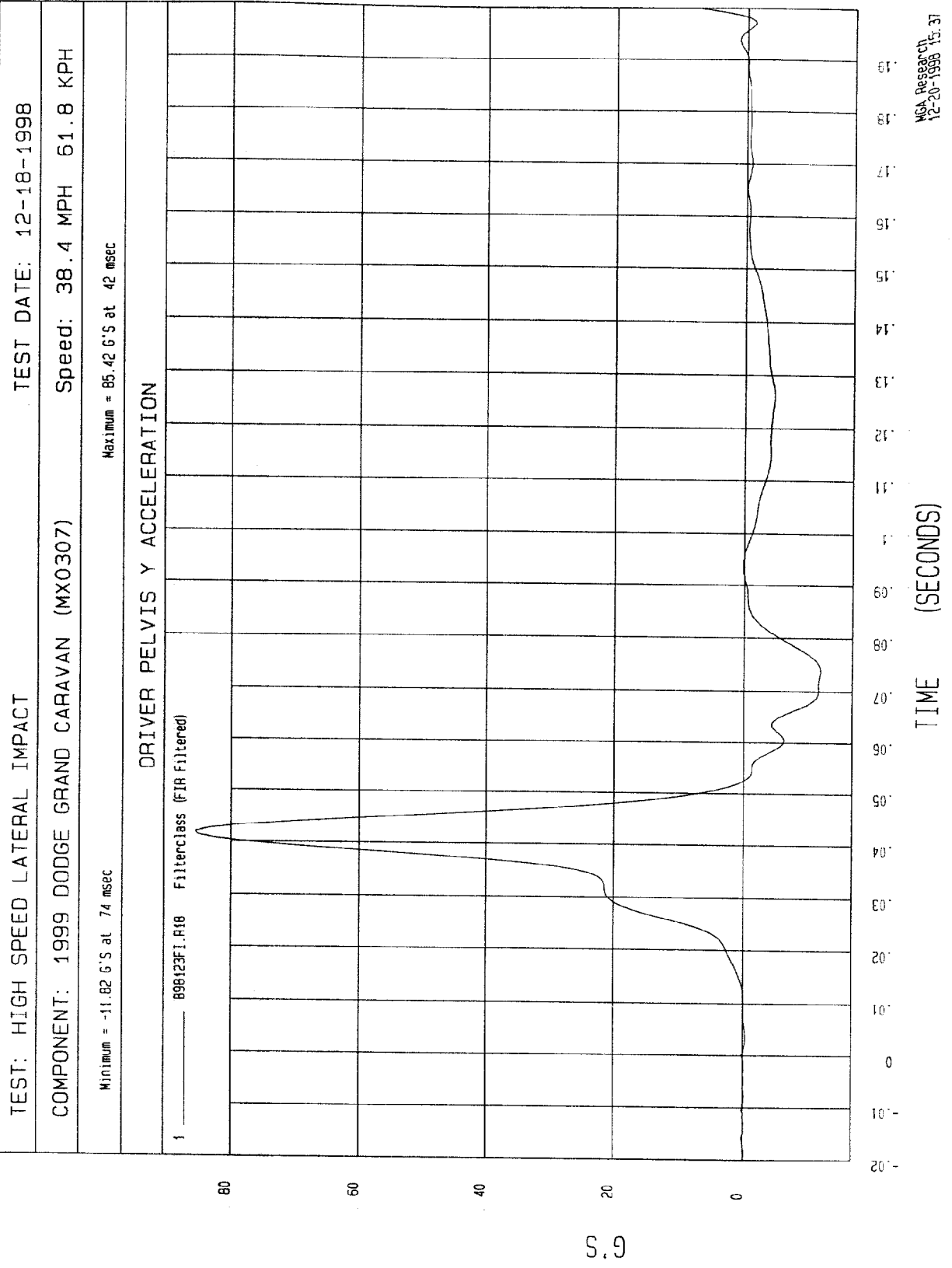
Minimum = -0.10 G'S at 60 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 _____ B98123FI.R44 Filterclass (FIR Filtered)



MGA Research
12-20-1998 15:37

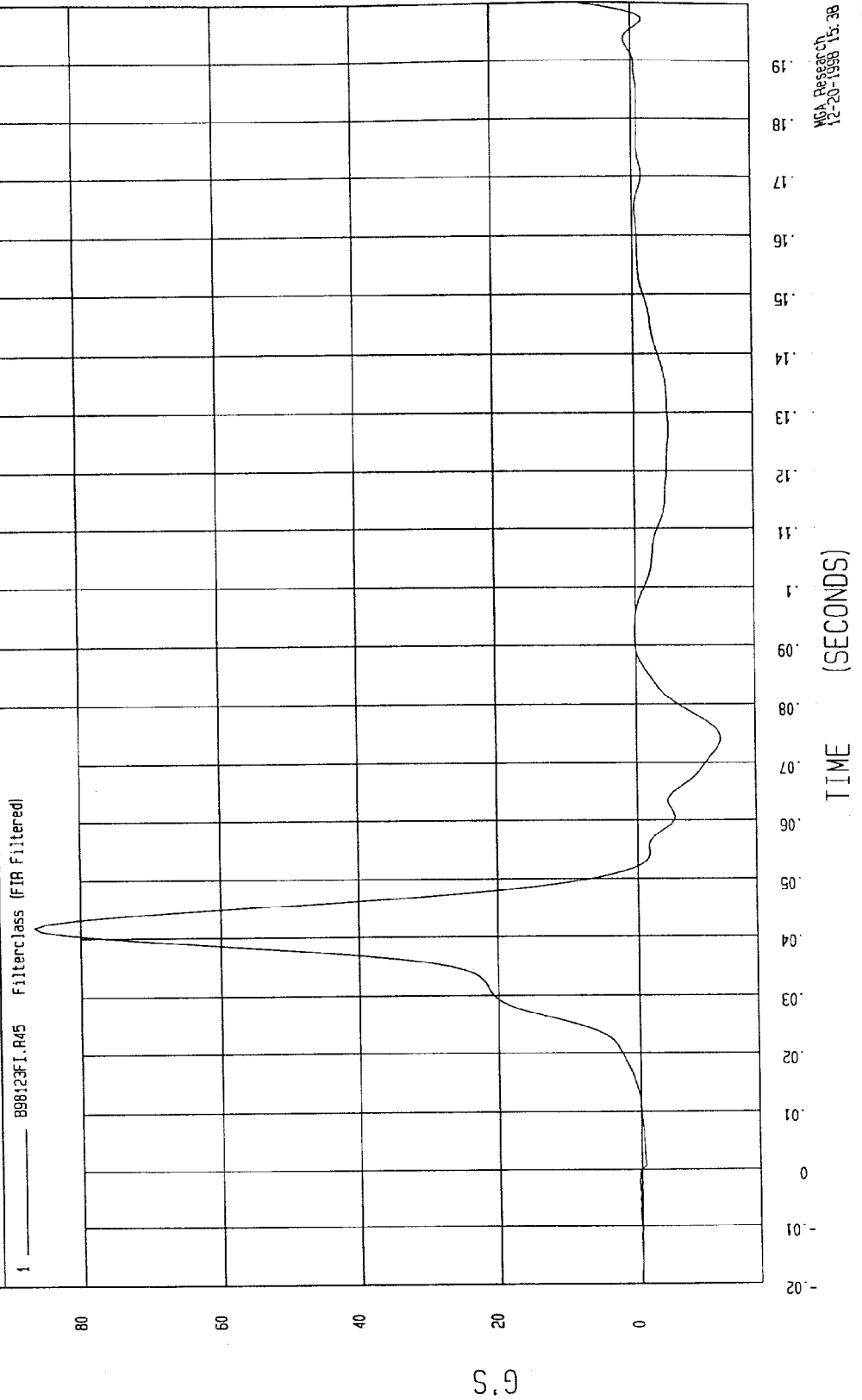


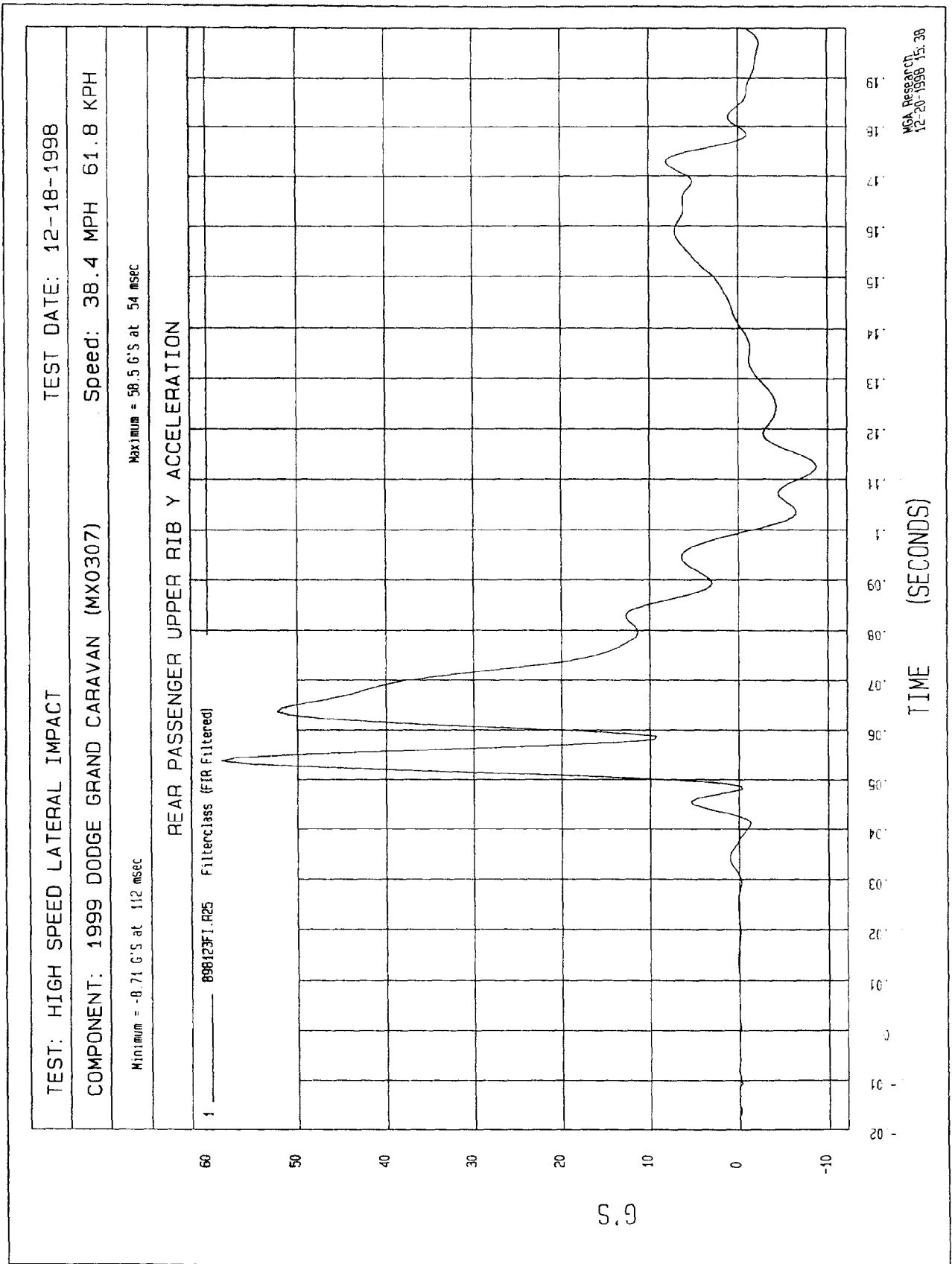
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -11.87 G'S at 74 msec Maximum = 86.49 G'S at 42 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



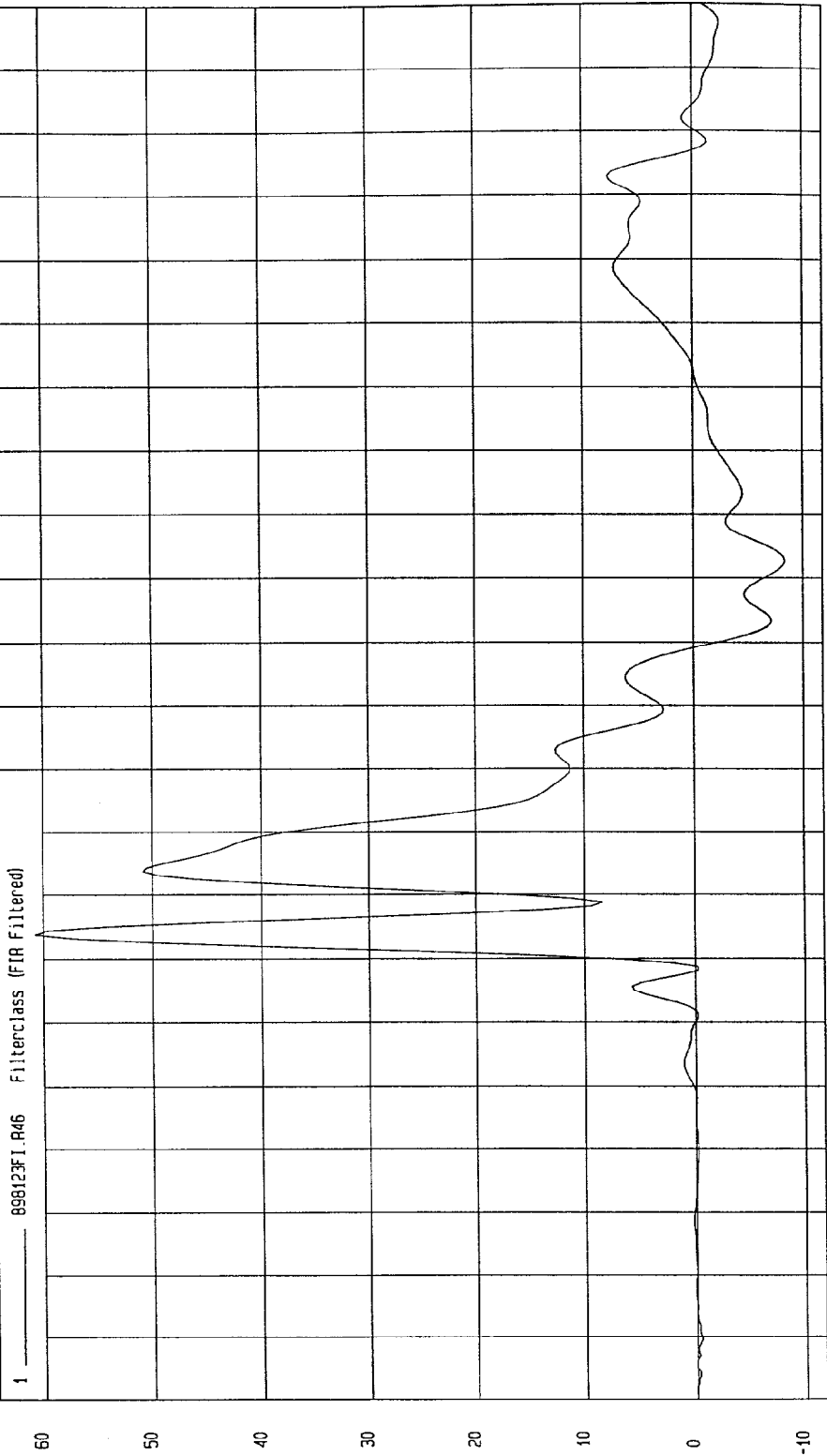


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -8.33 G'S at 112 msec Maximum = 60.76 G'S at 54 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION



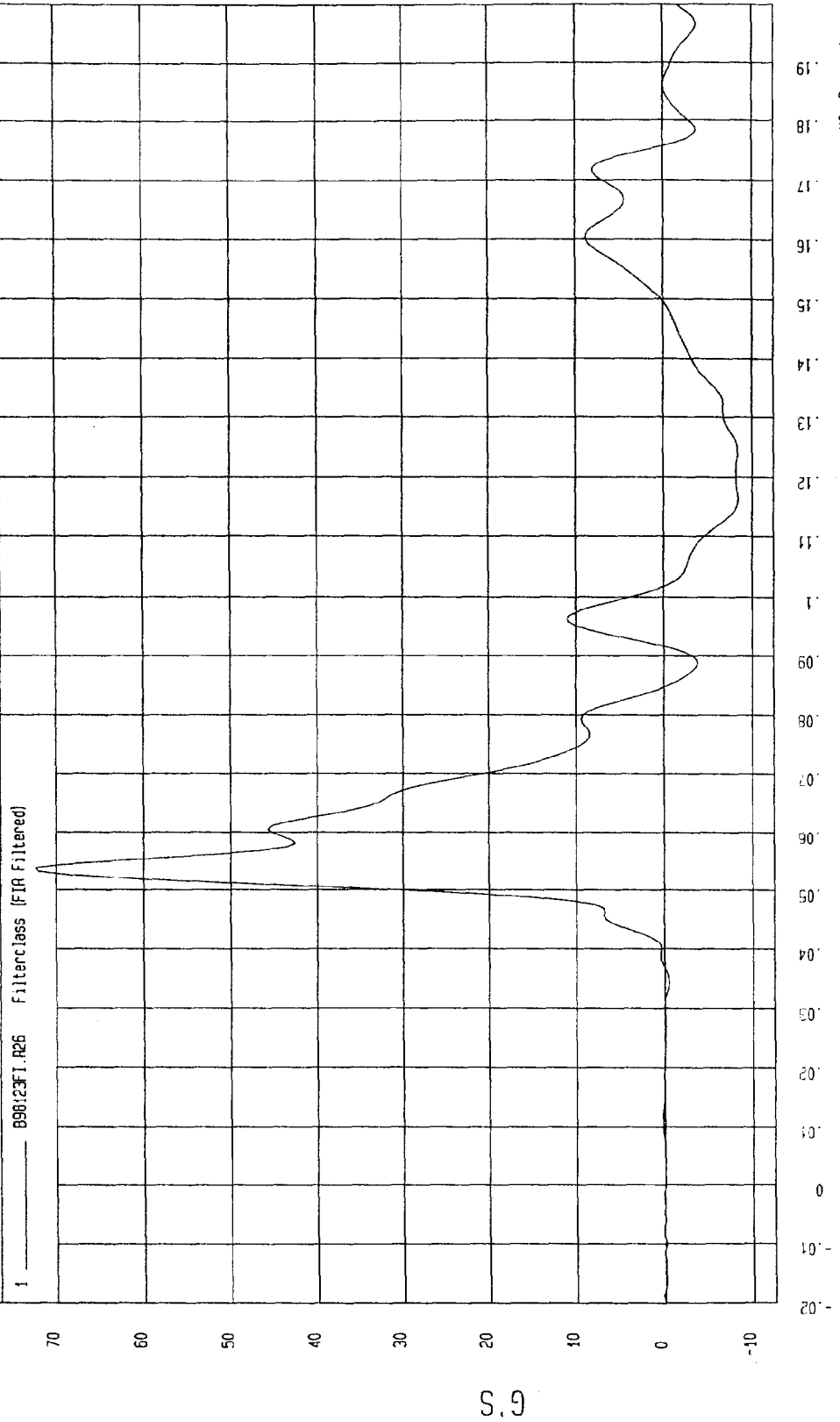
MGA Research
12-20-1998 15:38

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

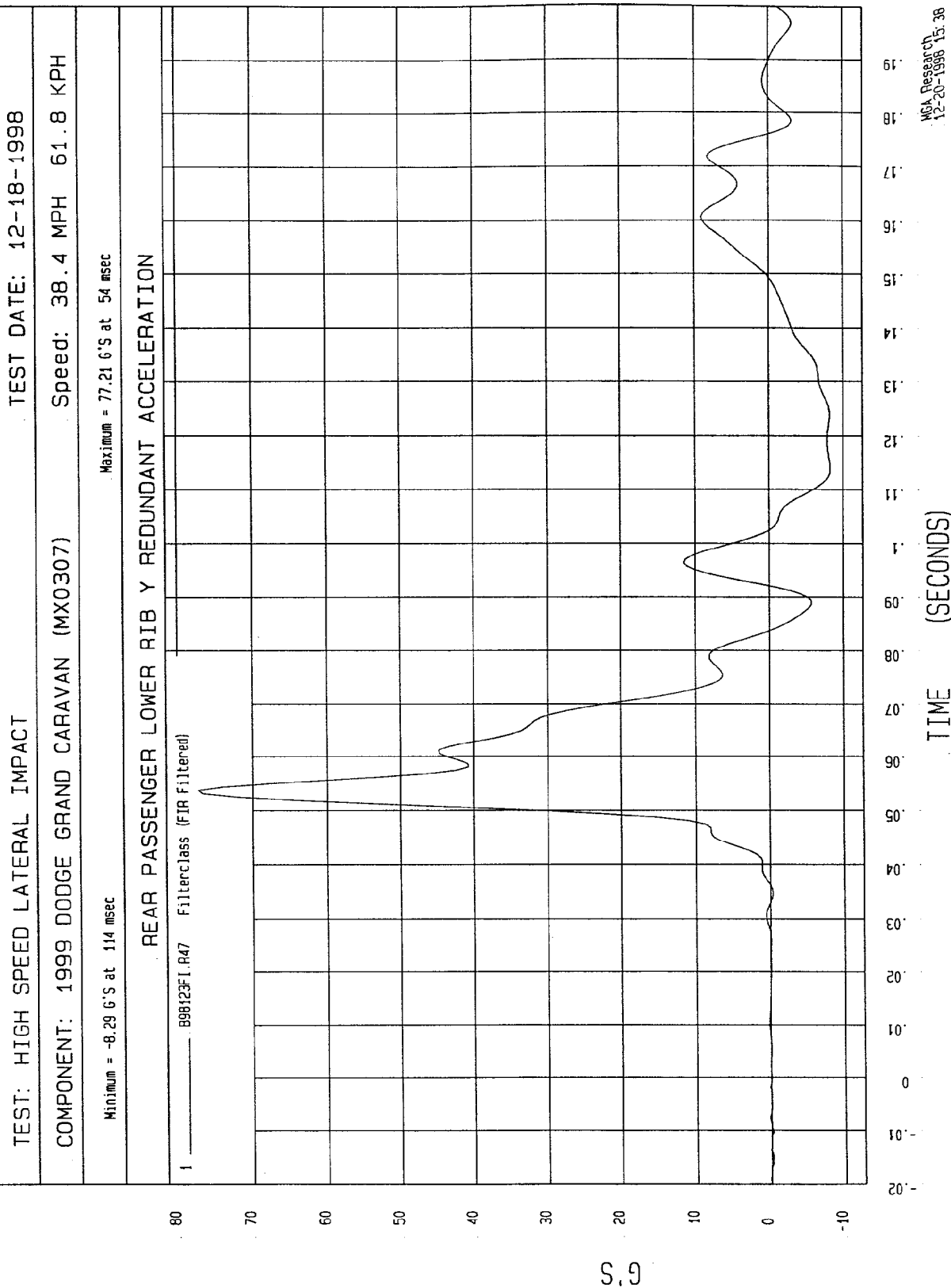
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -8.42 G'S at 116 msec Maximum = 72.32 G'S at 54 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



MCA Research
12-20-1998 15:38

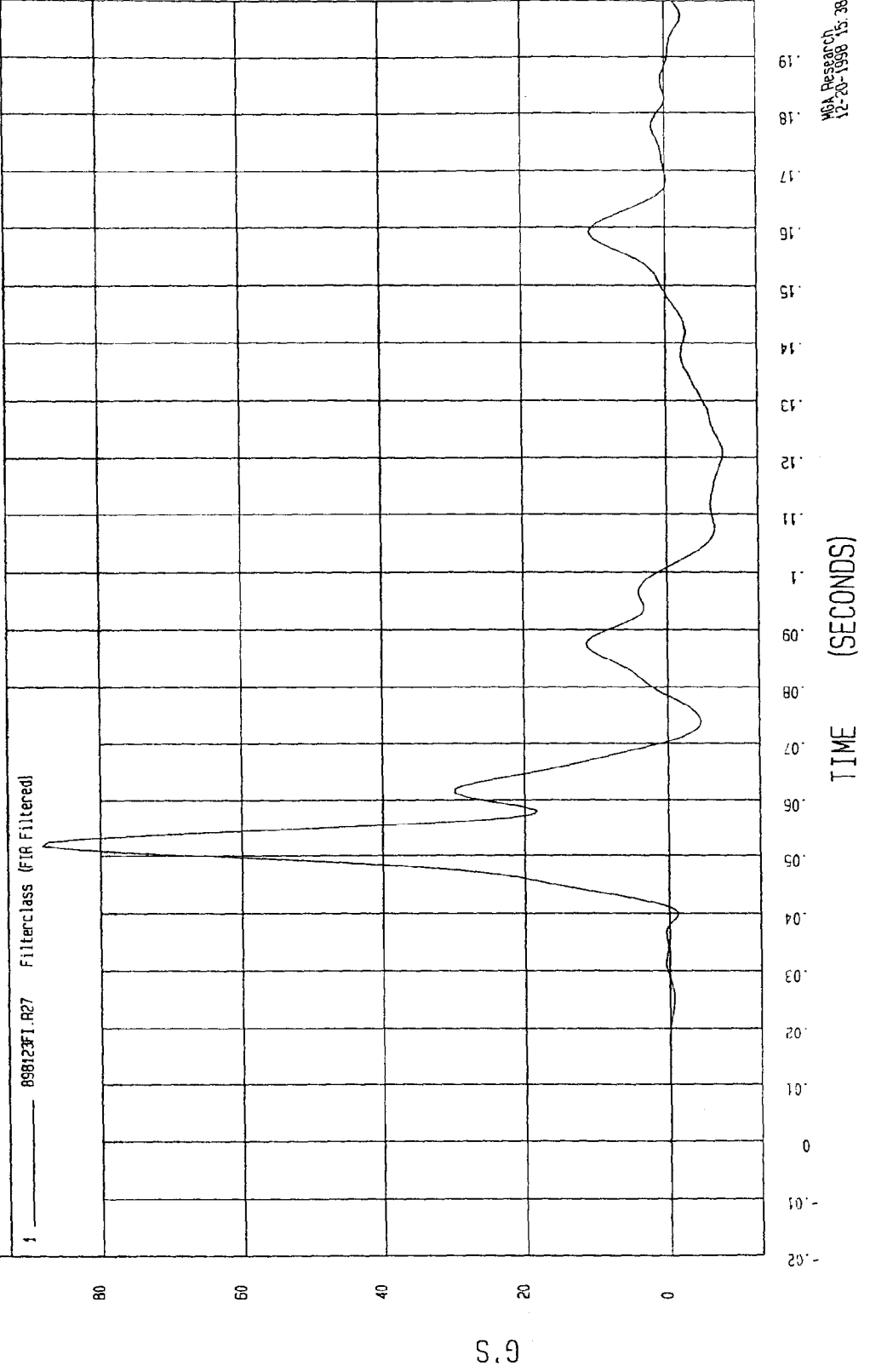


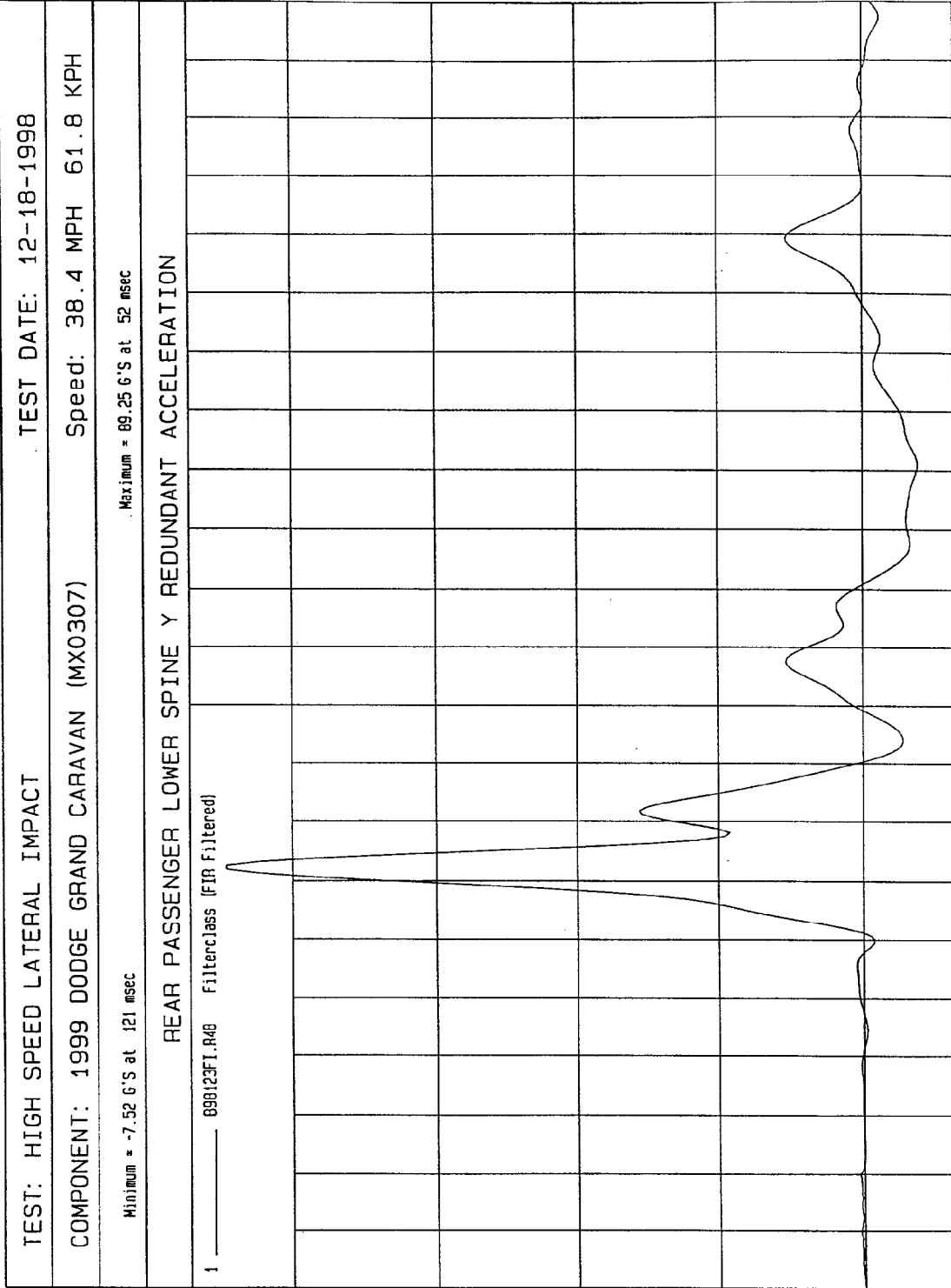
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -1.73 G'S at 121 msec Maximum = 88.08 G'S at 52 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION





MSA Research
12-20-1998 15:38

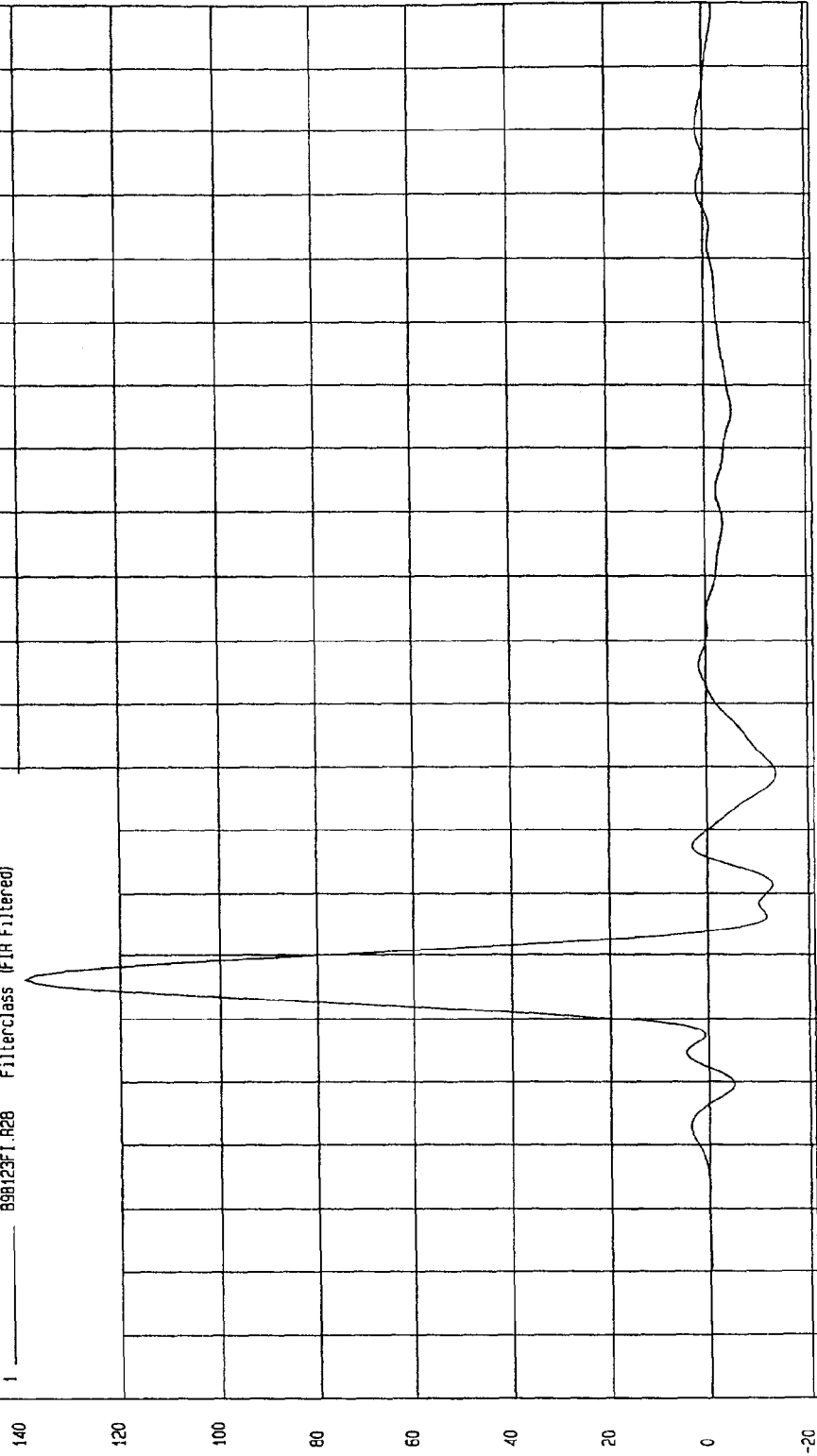
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-18-1998

COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307) Speed: 38.4 MPH 61.8 KPH

Minimum = -13.59 G'S at 79 msec Maximum = 139.23 G'S at 46 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 898123F1.R28 Filterclass (FIR Filtered)



MGA Research
12-20-1998 15:38

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-18-1998

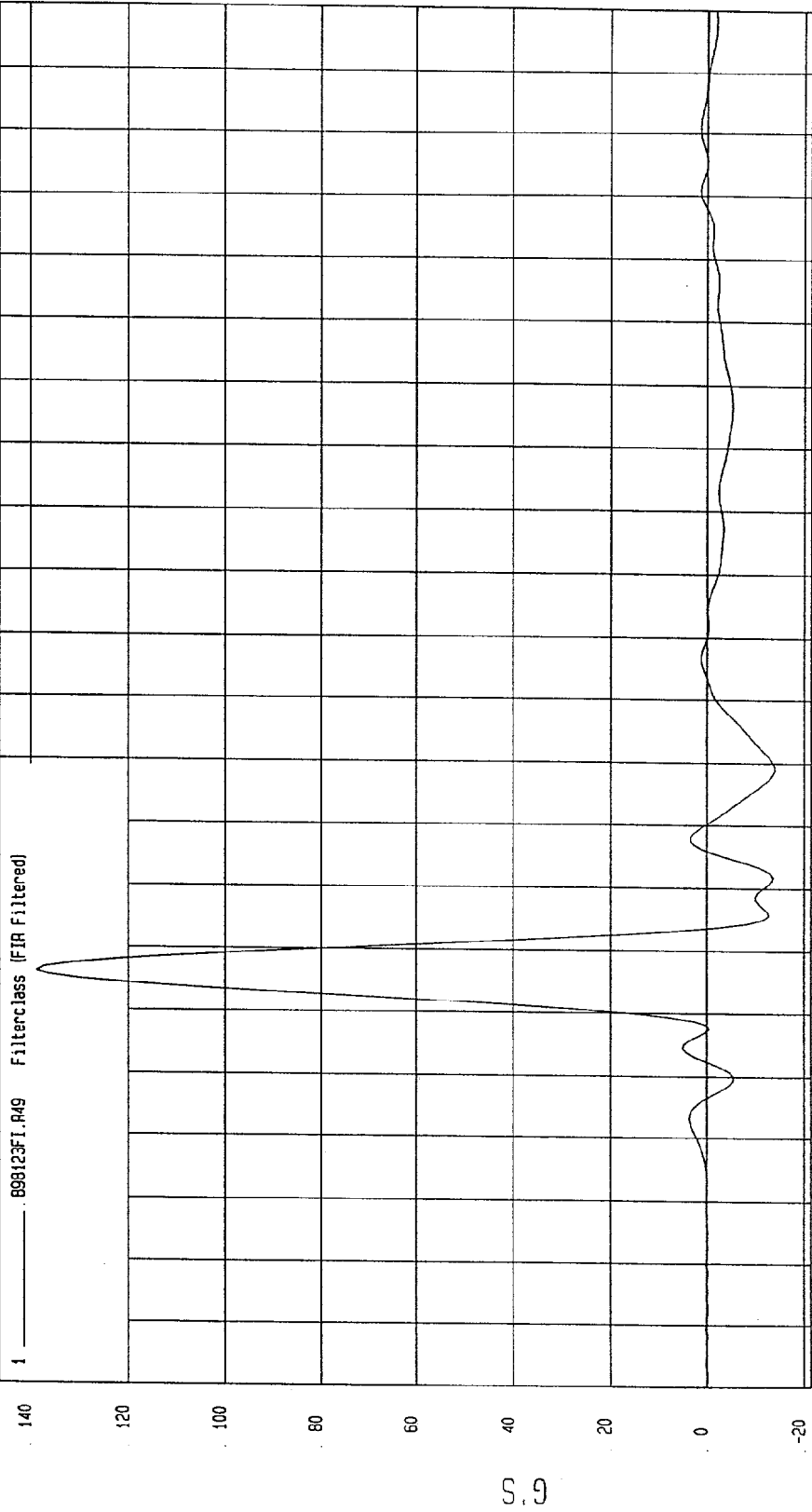
COMPONENT: 1999 DODGE GRAND CARAVAN (MX0307)

Speed: 38.4 MPH 61.8 KPH

Minimum = -13.78 G'S at 79 msec

Maximum = 138.79 G'S at 46 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION



MCA Research
12-20-1998 15:38

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 271

Calibration Test Results Summary

Driver Dummy Serial Number: 271

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NUMBER: 271DATE OF VERIFICATION: December 16, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	895
RH - Rib Height (mm)	501 - 521	505
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	236
KV - Knee Pivot From Back Line (mm)	511 - 526	518
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	373

MEASUREMENTS BY: Tim W. L.APPROVED BY: Rene Kalsche

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

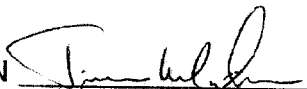
SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 271TEST NUMBER: D981682

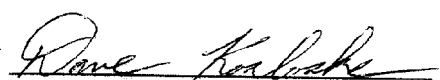
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46 g's	42
LOWER RIB (g's)	37 - 46 g's	43
LOWER SPINE (g's)	15 - 22 g's	22

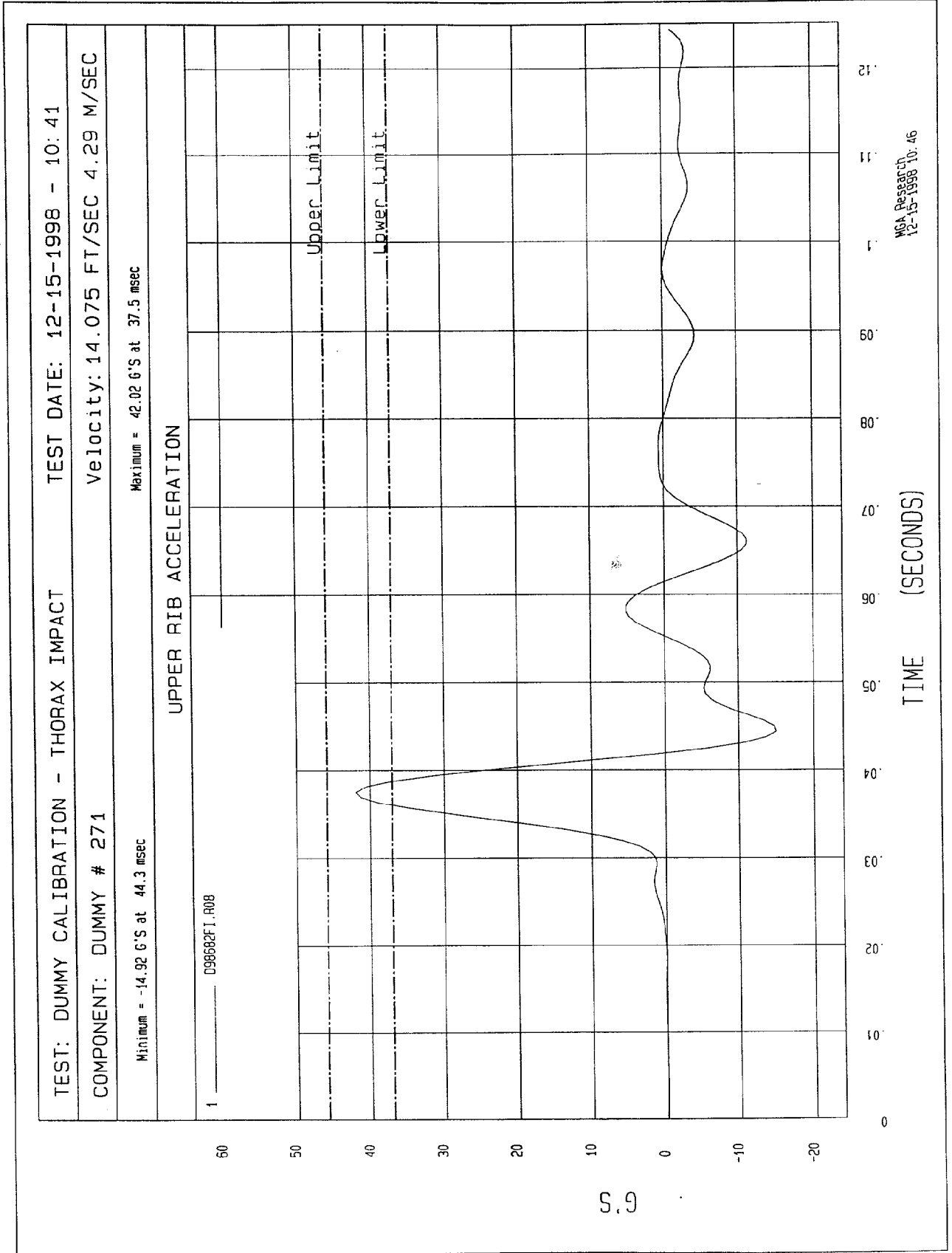
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1998 - 10:41

COMPONENT: DUMMY # 271 Velocity: 14.075 FT/SEC 4.29 M/SEC

Minimum = -14.26 G'S at 44.3 msec

Maximum = 42.73 G'S at 37.5 msec

LOWER RIB ACCELERATION

1 096682F1.R09

G.S

Upper Limit

Lower Limit

12

11

10

09

08

07

06

05

04

03

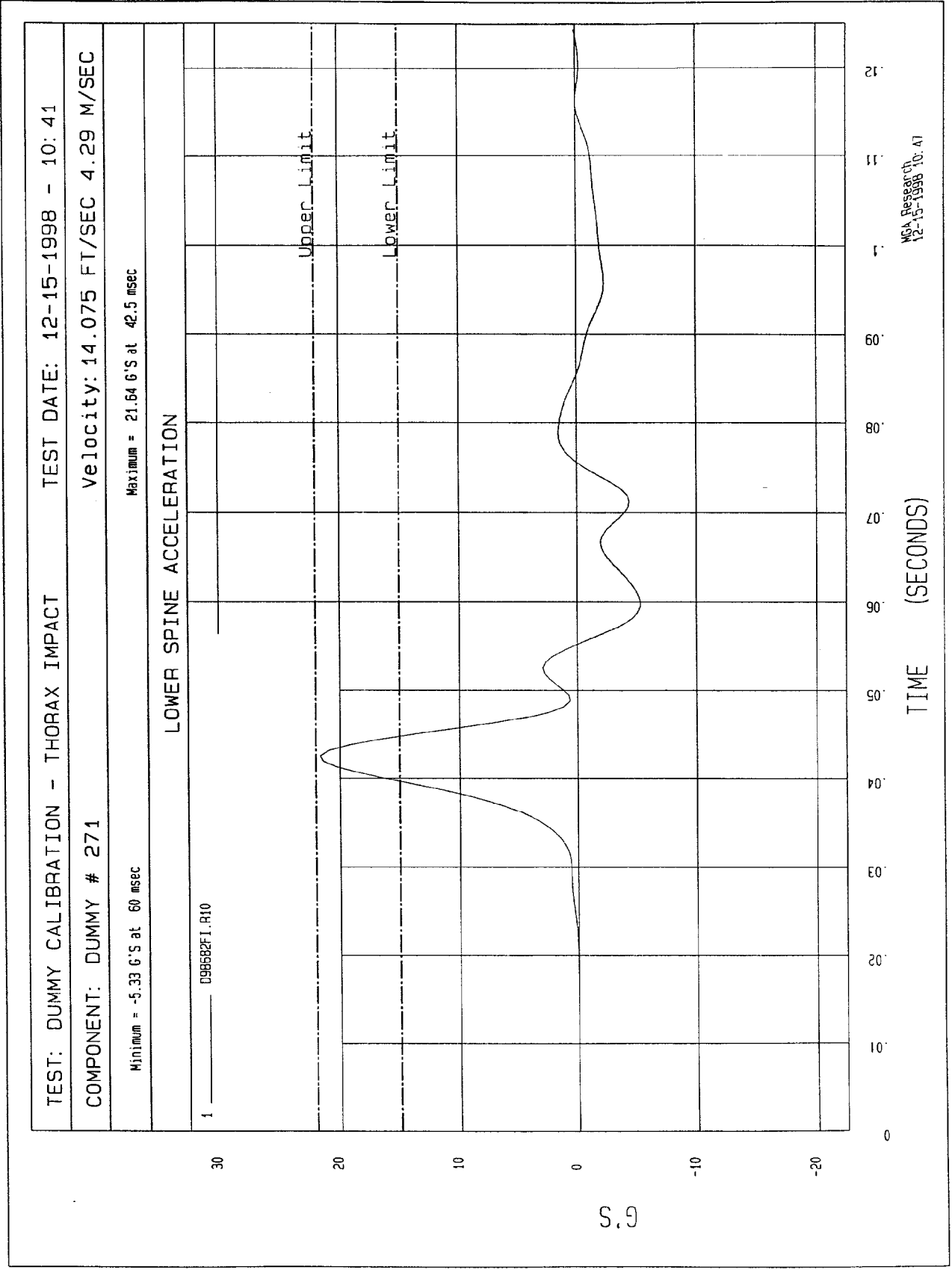
02

01

00

TIME (SECONDS)

NSA Research
12-15-1998 10:41



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

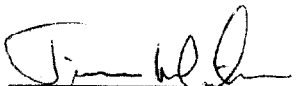
SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 271TEST NUMBER: D981683

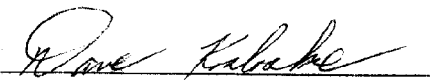
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	46

TEST MEETS SPECIFICATIONS

TECHNICIAN



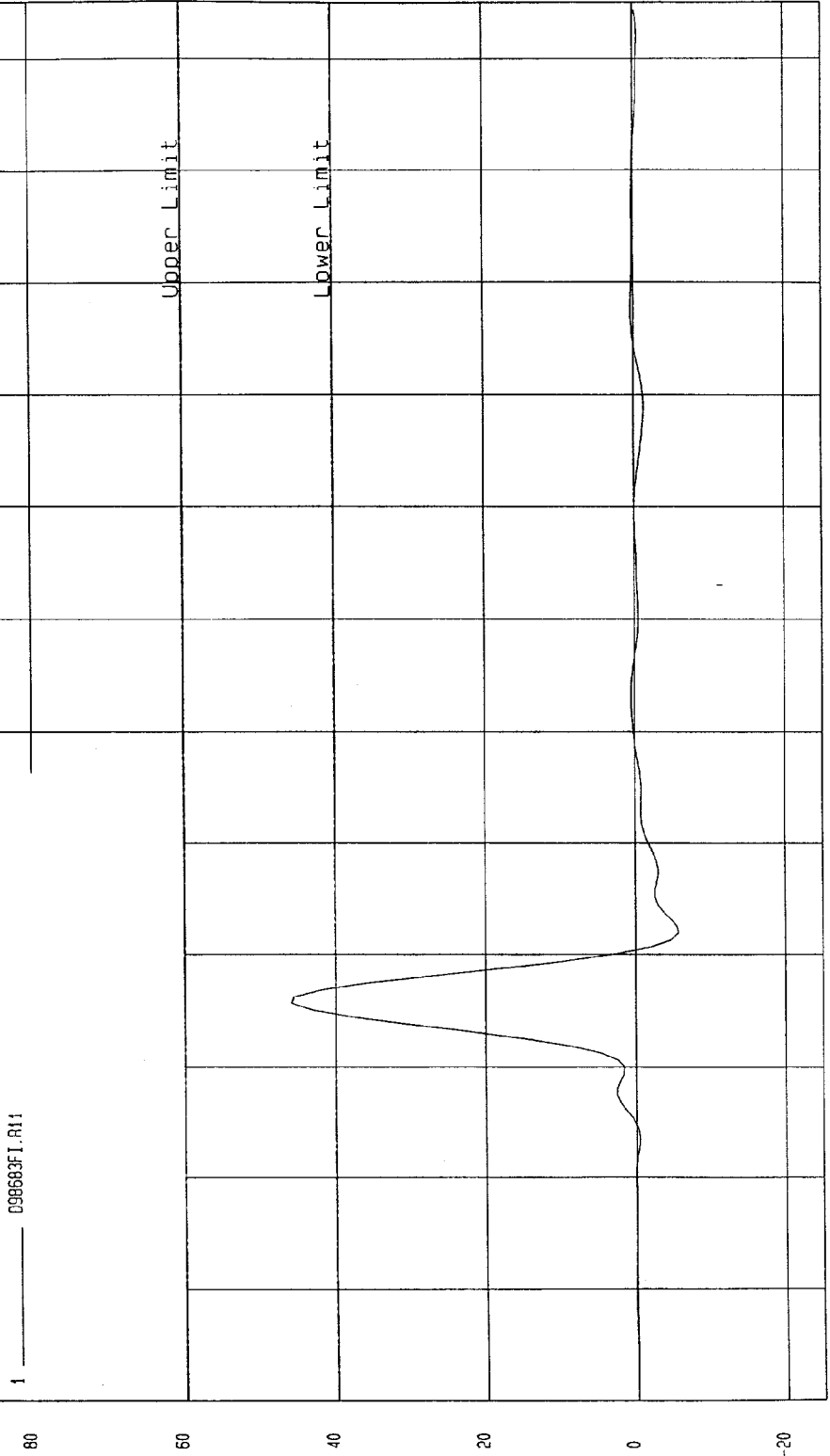
APPROVED BY



TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 12-15-1998 - 10: 46
COMPONENT: DUMMY # 271 Velocity: 14.062 FT/SEC 4.29 M/SEC

Minimum = -5.79 G'S at 41.8 msec Maximum = 45.92 G'S at 35.6 msec

PELVIS ACCELERATION



TIME (SECONDS)

MCA Research
12-15-1998 10: 47

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST

(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 271TEST NUMBER: D981684

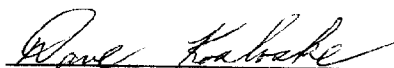
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 12.7 mm	104 - 162	145
FORCE @ 19.0 mm	163 - 222	203
FORCE @ 25.4 mm	222 - 280	268
FORCE @ 33 mm	325 - 391	374

TEST MEETS SPECIFICATIONS

TECHNICIAN



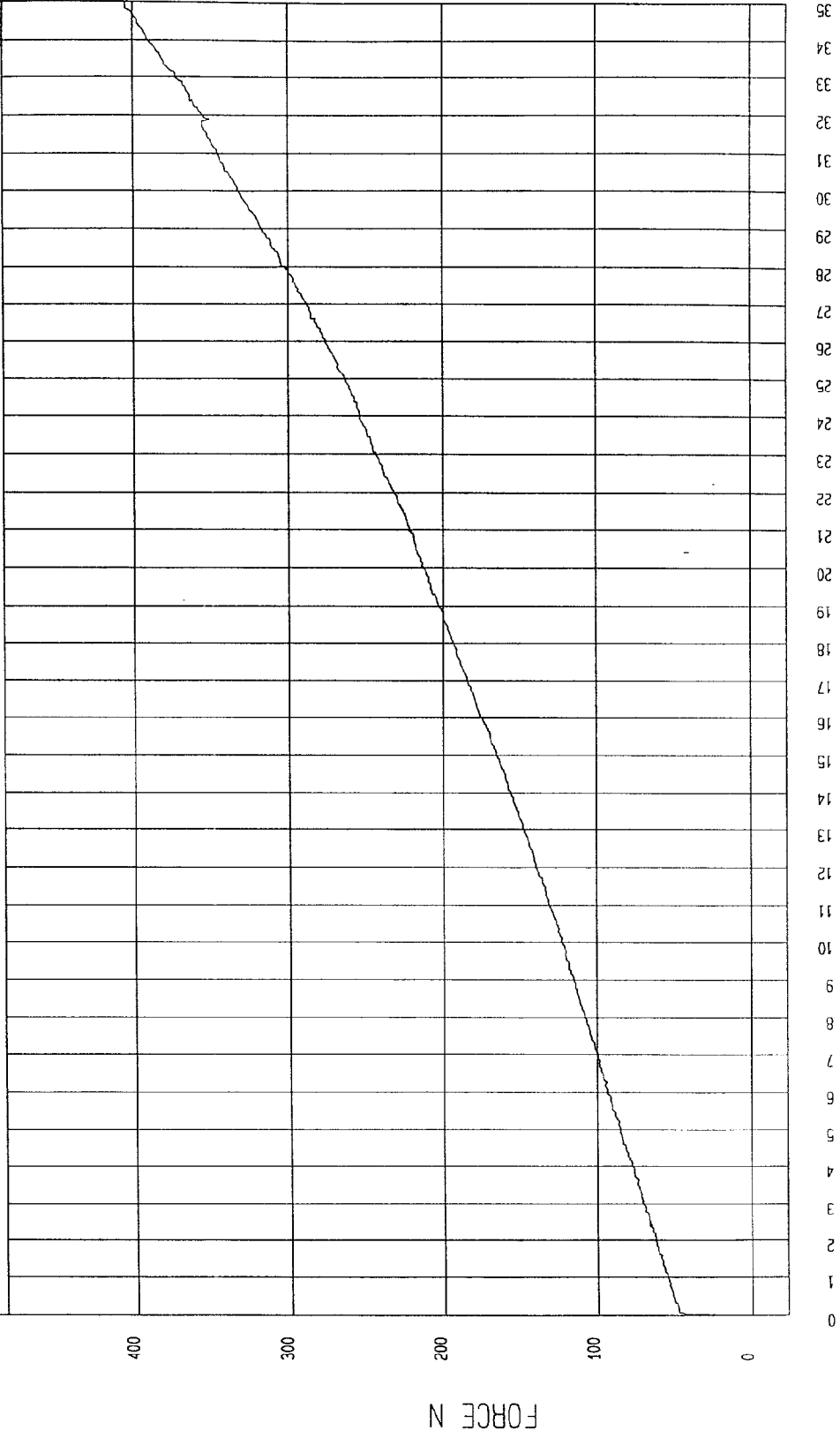
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-16-1998 - 09:11:27

COMPONENT: DUMMY # 271

FORCE as a function of DISPLACEMENT



MGA Research
12-16-1998 09:21

DISPLACEMENT mm

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

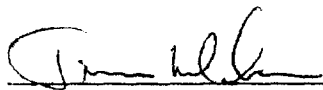
SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 271TEST NUMBER: D981685

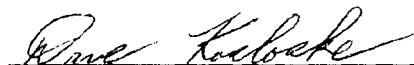
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	124.6
FORCE @ 30°	151.2 - 204.6	156.7
FORCE @ 40°	204.6 - 258.0	216.9
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN



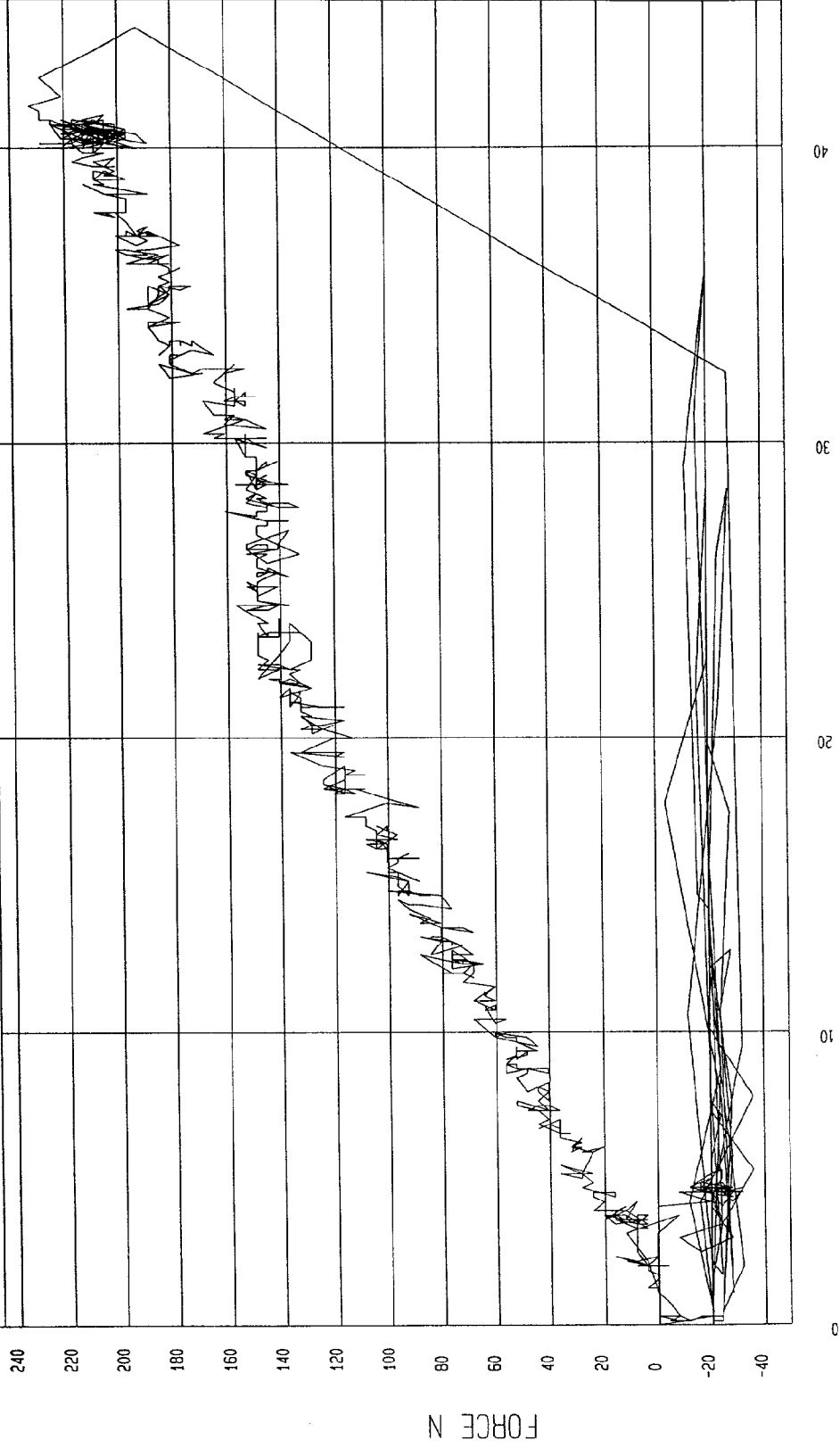
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-16-1998 - 10:37:52

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



MCA Research
12-16-1998 10:54

PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Passenger Dummy Serial Number: 272

Pre-Test Calibration

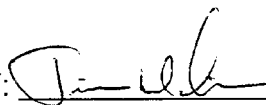
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

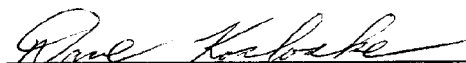
DUMMY SERIAL NUMBER: 272DATE OF VERIFICATION: December 16, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	892
RH - Rib Height (mm)	501 - 521	512
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	238
KV - Knee Pivot From Back Line (mm)	511 - 526	523
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	378

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 272TEST NUMBER: D981702

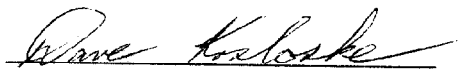
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.30
UPPER RIB (g's)	37 - 46 g's	44
LOWER RIB (g's)	37 - 46 g's	42
LOWER SPINE (g's)	15 - 22 g's	16

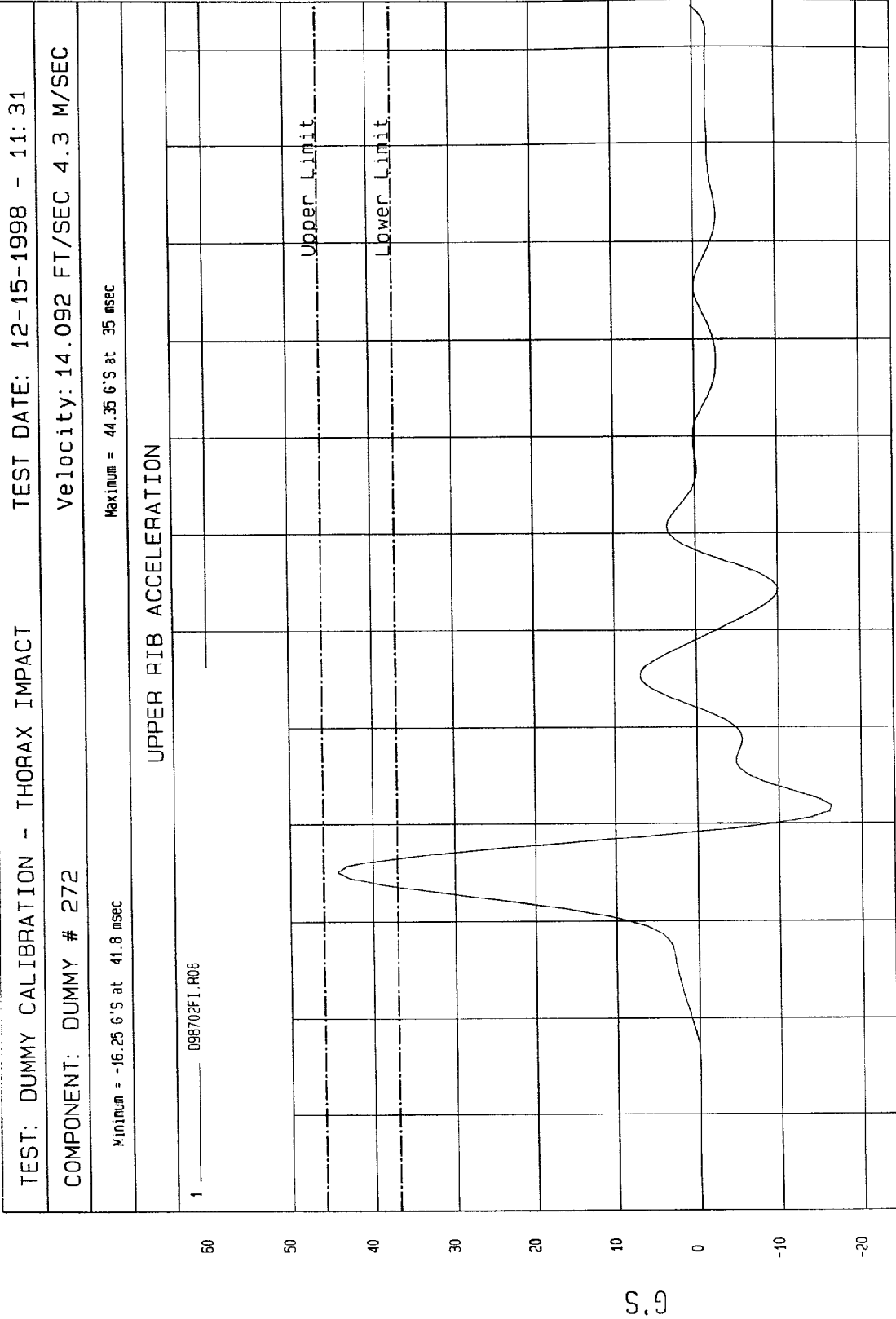
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





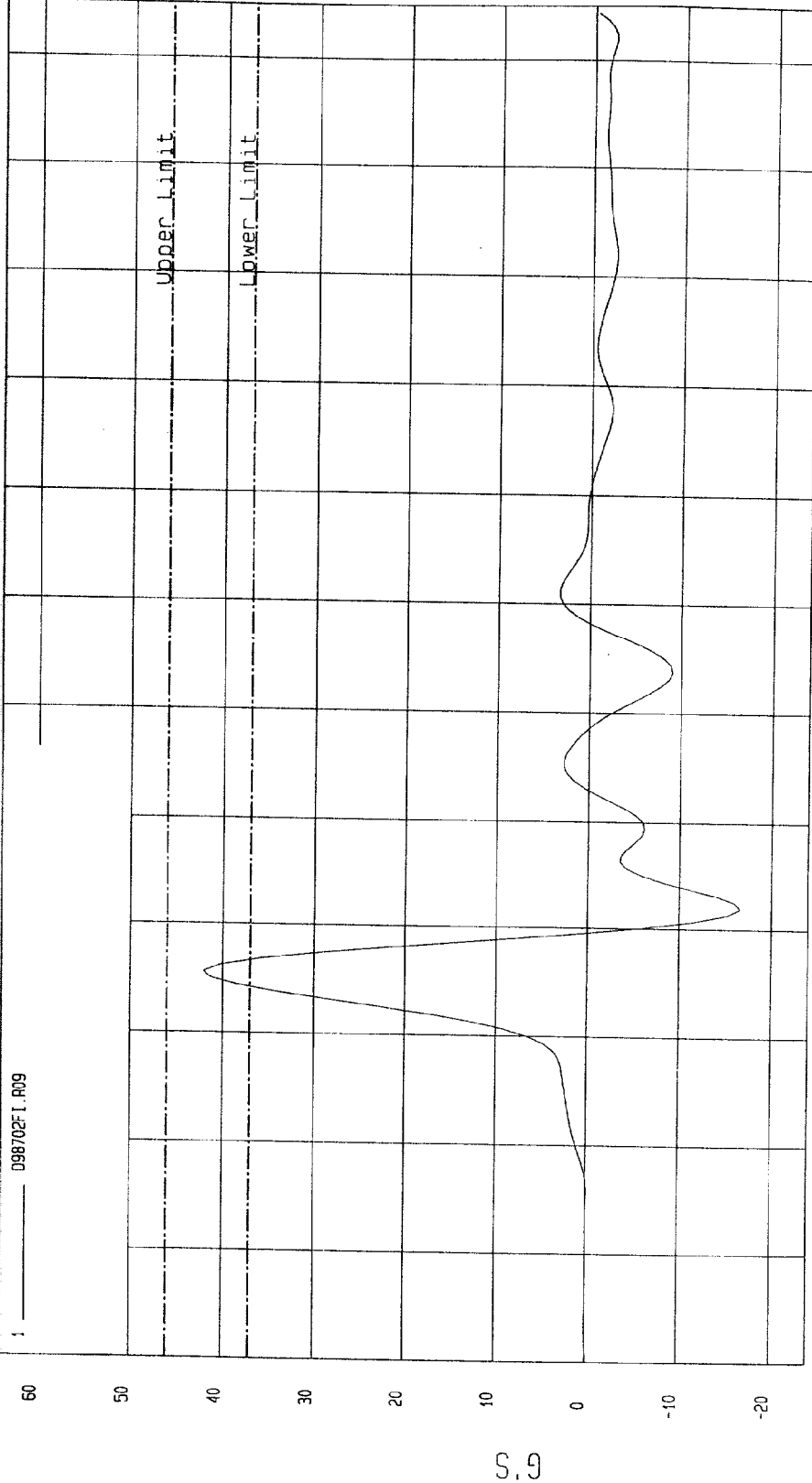
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1998 - 11:31

COMPONENT: DUMMY # 272 Velocity: 14.092 FT/SEC 4.3 M/SEC

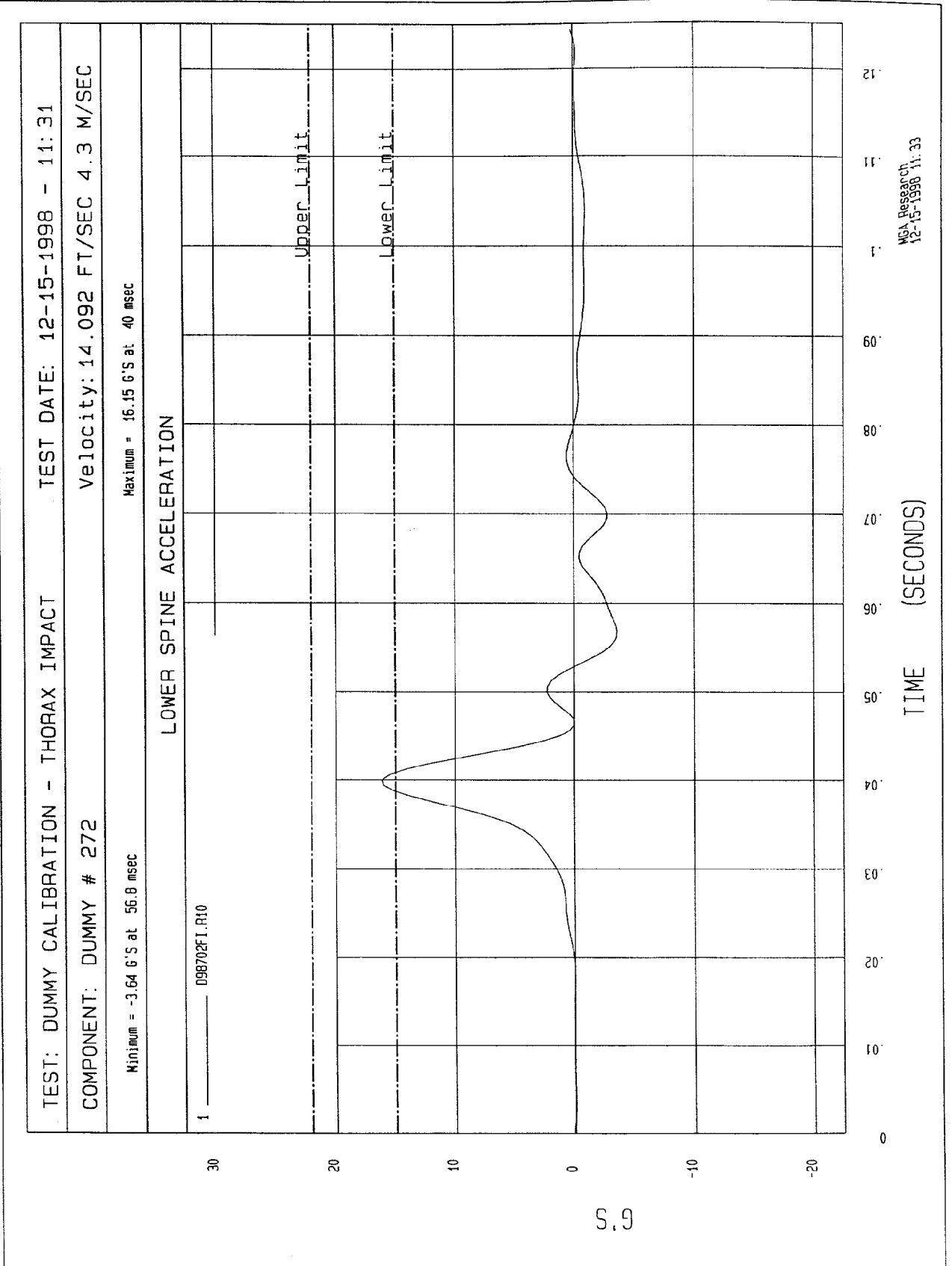
Minimum = -16.53 G'S at 41.8 msec Maximum = 42.06 G'S at 35.6 msec

LOWER RIB ACCELERATION

1 ——— D98702FI.R09



MGA Research
12-15-1998 11:32



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

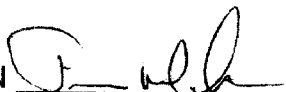
SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 272 TEST NUMBER: D981703

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	53

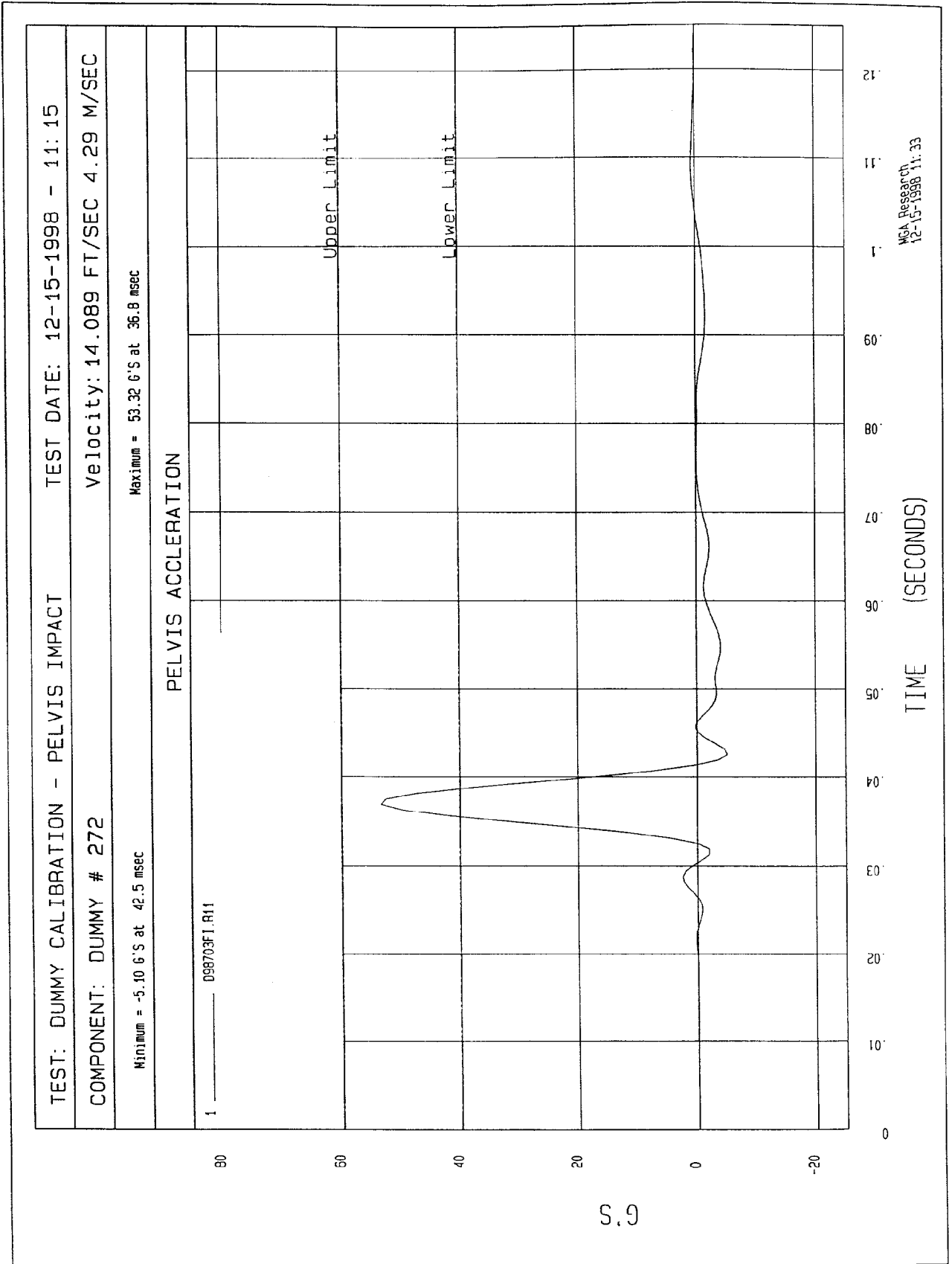
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST

(PRELOAD = 10 LBS)

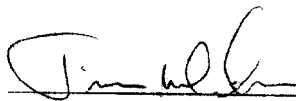
SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 272TEST NUMBER: D981704

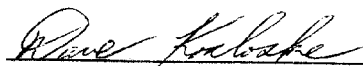
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 12.7 mm	104 - 162	143
FORCE @ 19.0 mm	163 - 222	198
FORCE @ 25.4 mm	222 - 280	260
FORCE @ 33 mm	325 - 391	353

TEST MEETS SPECIFICATIONS

TECHNICIAN



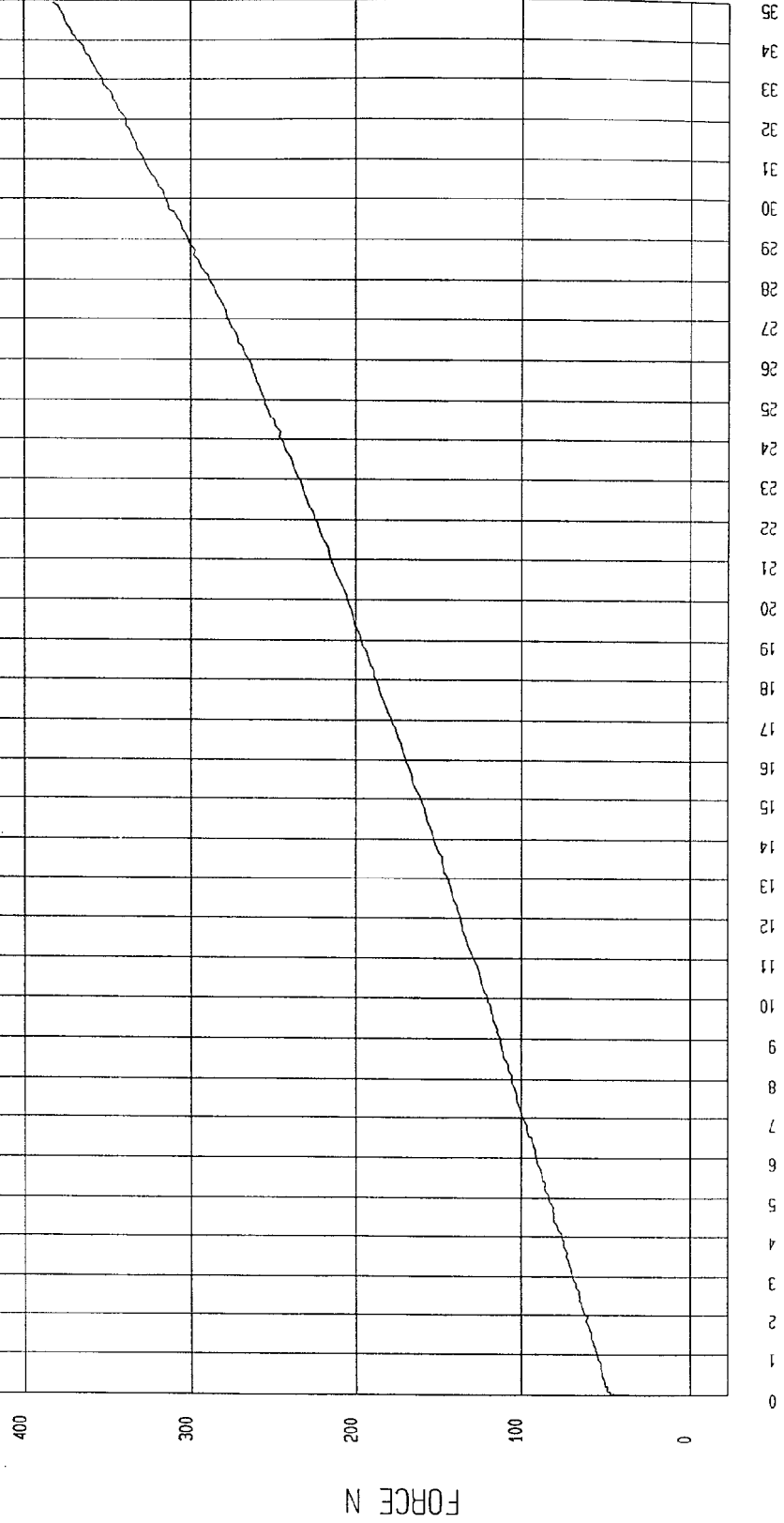
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-16-1998 - 09:15:30

COMPONENT: DUMMY # 272

FORCE as a function of DISPLACEMENT



MGA Research
12-16-1998 09:21

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 272TEST NUMBER: D981705

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	106.4
FORCE @ 30°	151.2 - 204.6	182.7
FORCE @ 40°	204.6 - 258.0	226.8
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN



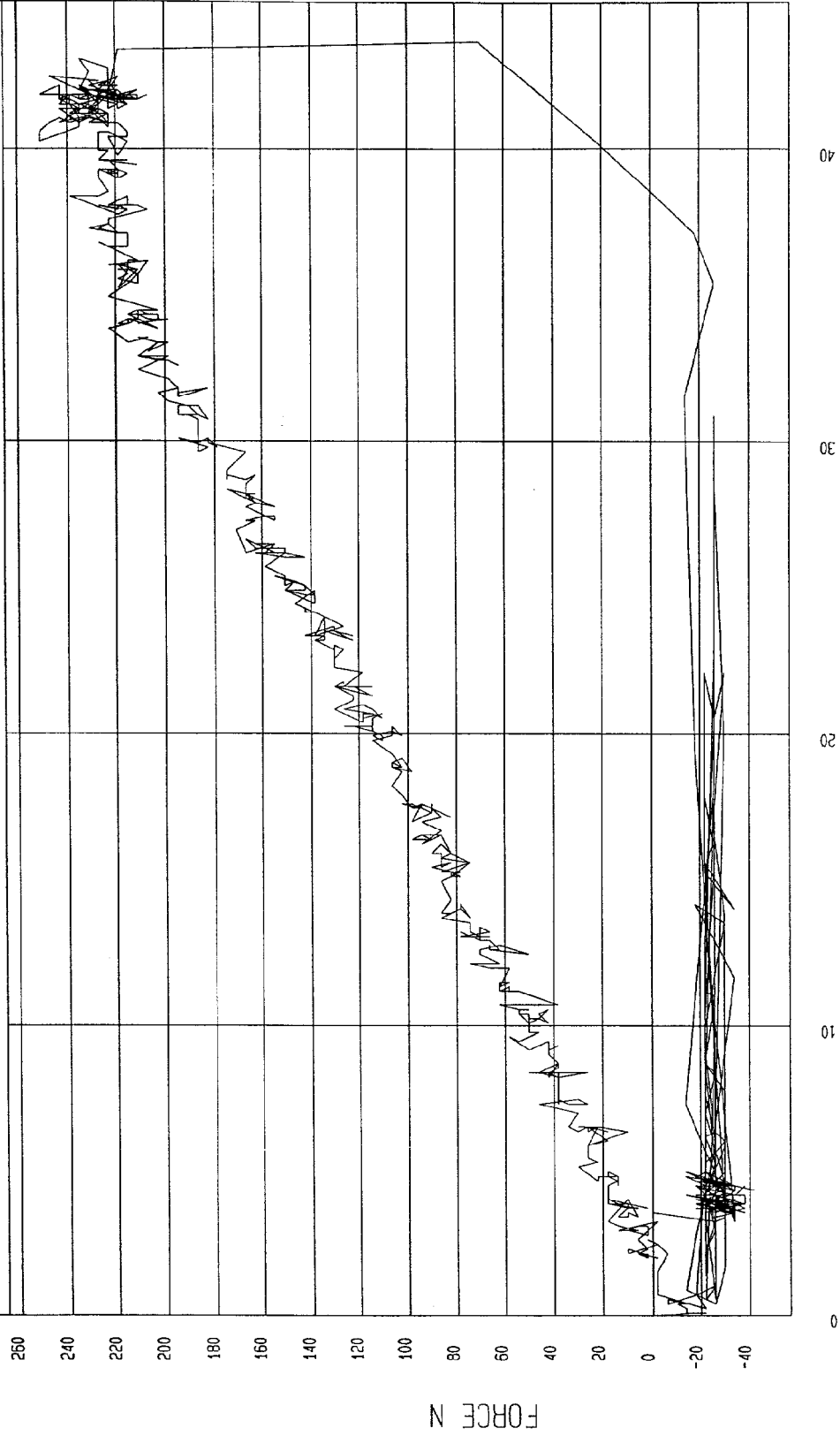
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-16-1998 - 10:10:48

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



MCA Research
12-16-1998 10:54

POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 271

Calibration Test Results Summary

Driver Dummy Serial Number: 271

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NUMBER: 271DATE OF VERIFICATION: January 7, 1999

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	895
RH - Rib Height (mm)	501 - 521	505
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	236
KV - Knee Pivot From Back Line (mm)	511 - 526	518
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	373

MEASUREMENTS BY: Jim W. L.APPROVED BY: Steve Kurbak

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

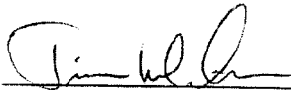
SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99042

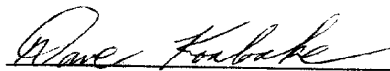
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46 g's	39
LOWER RIB (g's)	37 - 46 g's	42
LOWER SPINE (g's)	15 - 22 g's	21

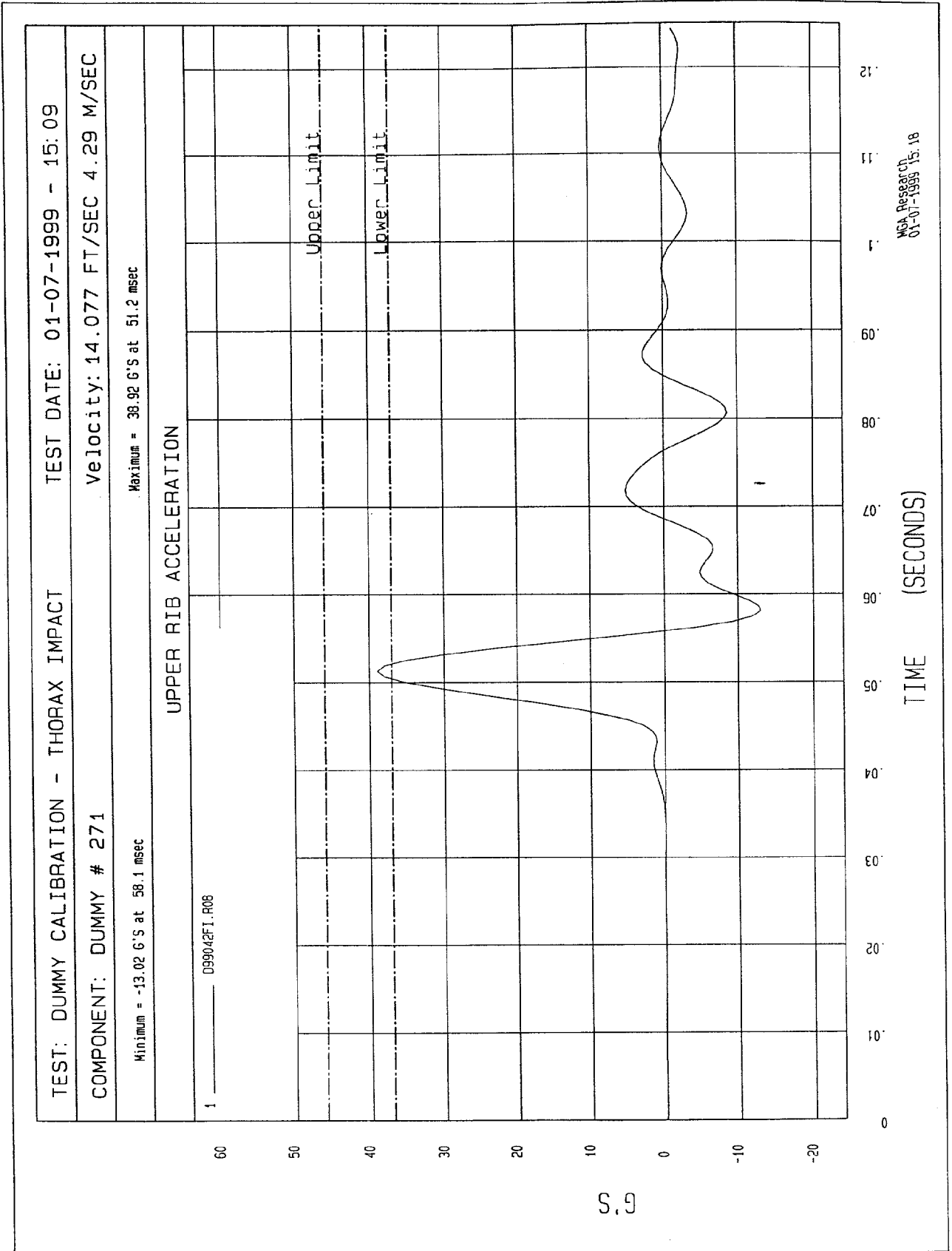
TEST MEETS SPECIFICATIONS

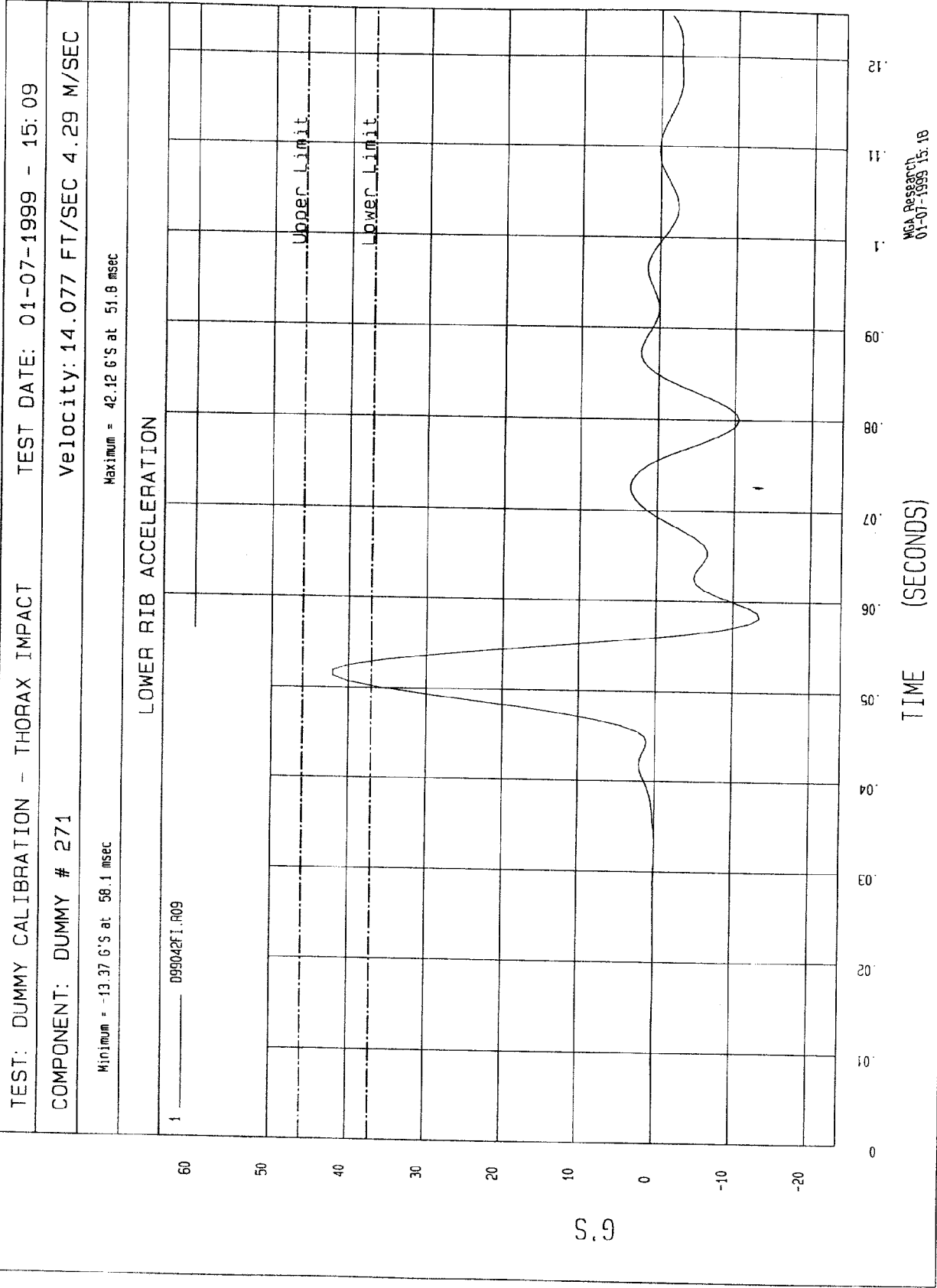
TECHNICIAN

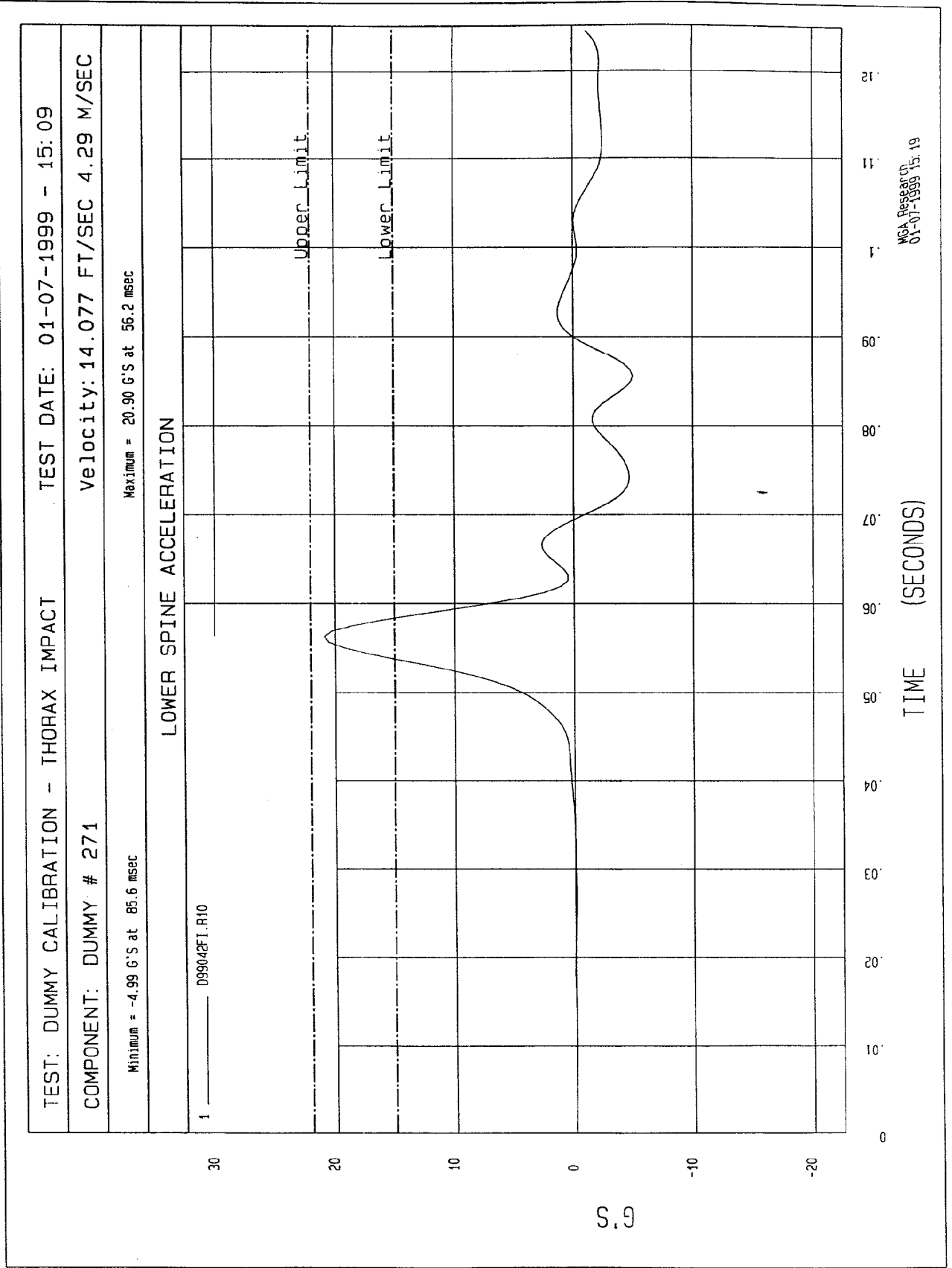


APPROVED BY









MCA Research
01-07-1999 15.19

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

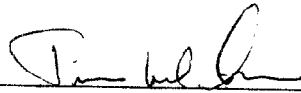
SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99043

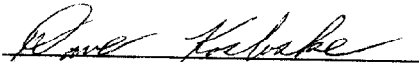
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	60

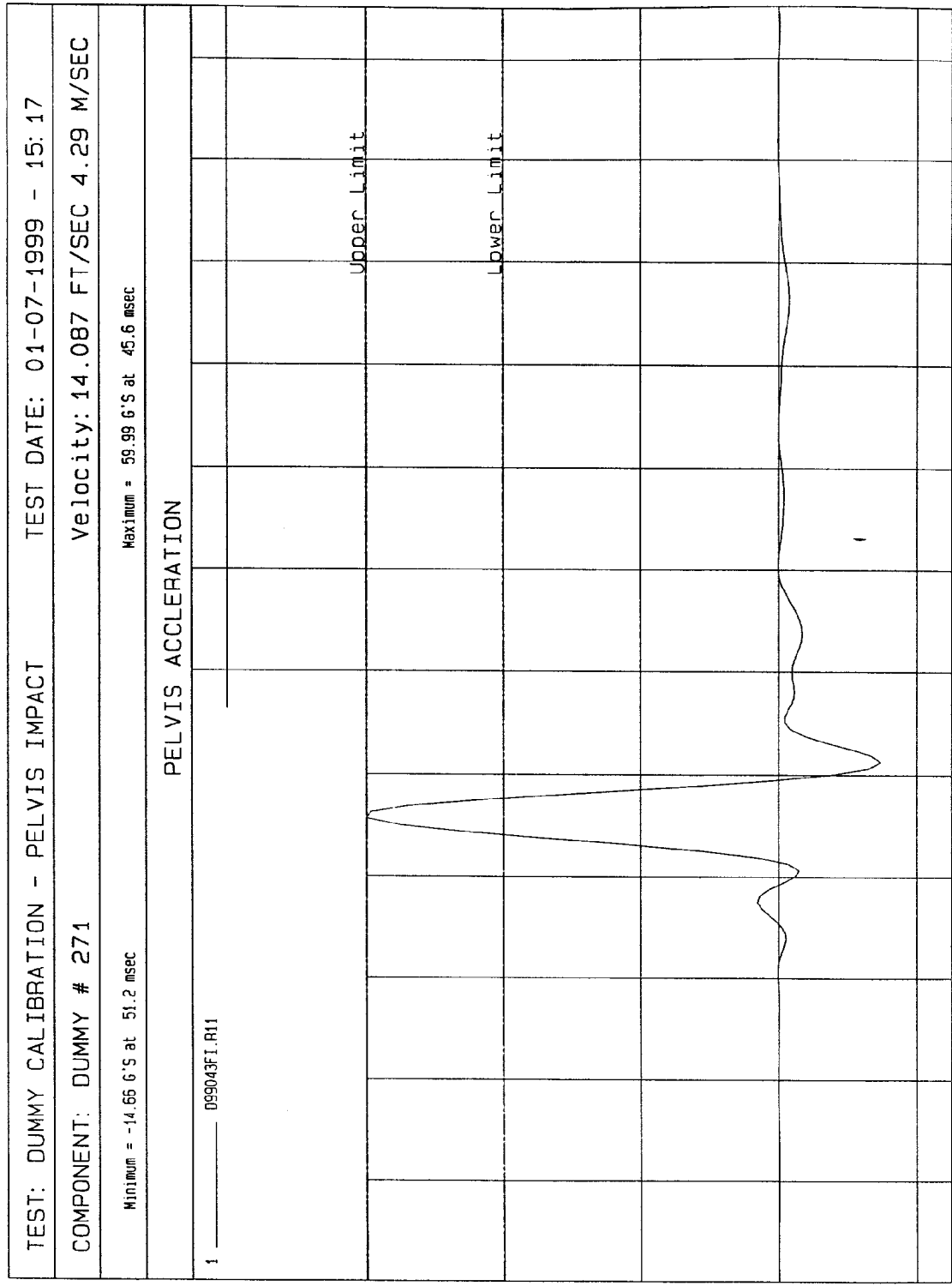
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MCA Research
01-07-1999 15:19

TIME (SECONDS)

G.S

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST

(PRELOAD = 10 LBS)

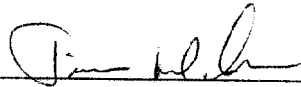
SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99044

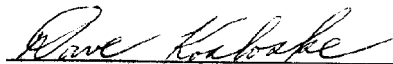
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	18%
FORCE @ 12.7 mm	104 - 162	140
FORCE @ 19.0 mm	163 - 222	197
FORCE @ 25.4 mm	222 - 280	260
FORCE @ 33 mm	325 - 391	348

TEST MEETS SPECIFICATIONS

TECHNICIAN



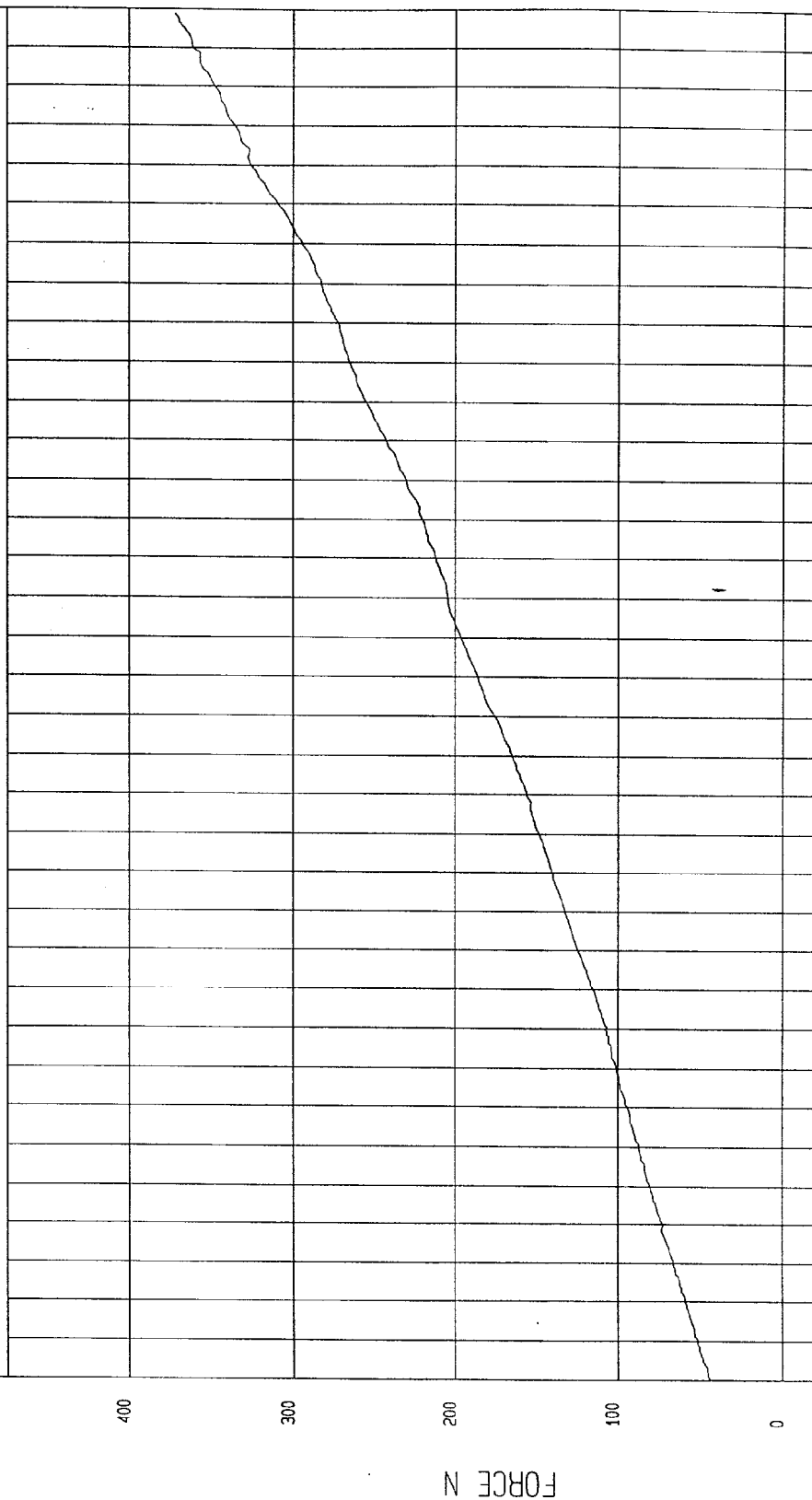
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-07-1999 - 11:40:12

COMPONENT: DUMMY # 271

FORCE as a function of DISPLACEMENT



MCA Research
01-12-1999 12:28

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

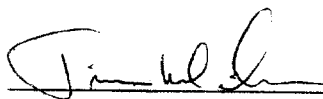
SIDE IMPACT DUMMY (SID)

DATE: January 6, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99045

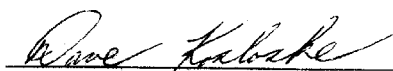
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	104.8
FORCE @ 30°	151.2 - 204.6	157.0
FORCE @ 40°	204.6 - 258.0	205.2
RETURN ANGLE	12° maximum	3°

TEST MEETS SPECIFICATIONS

TECHNICIAN



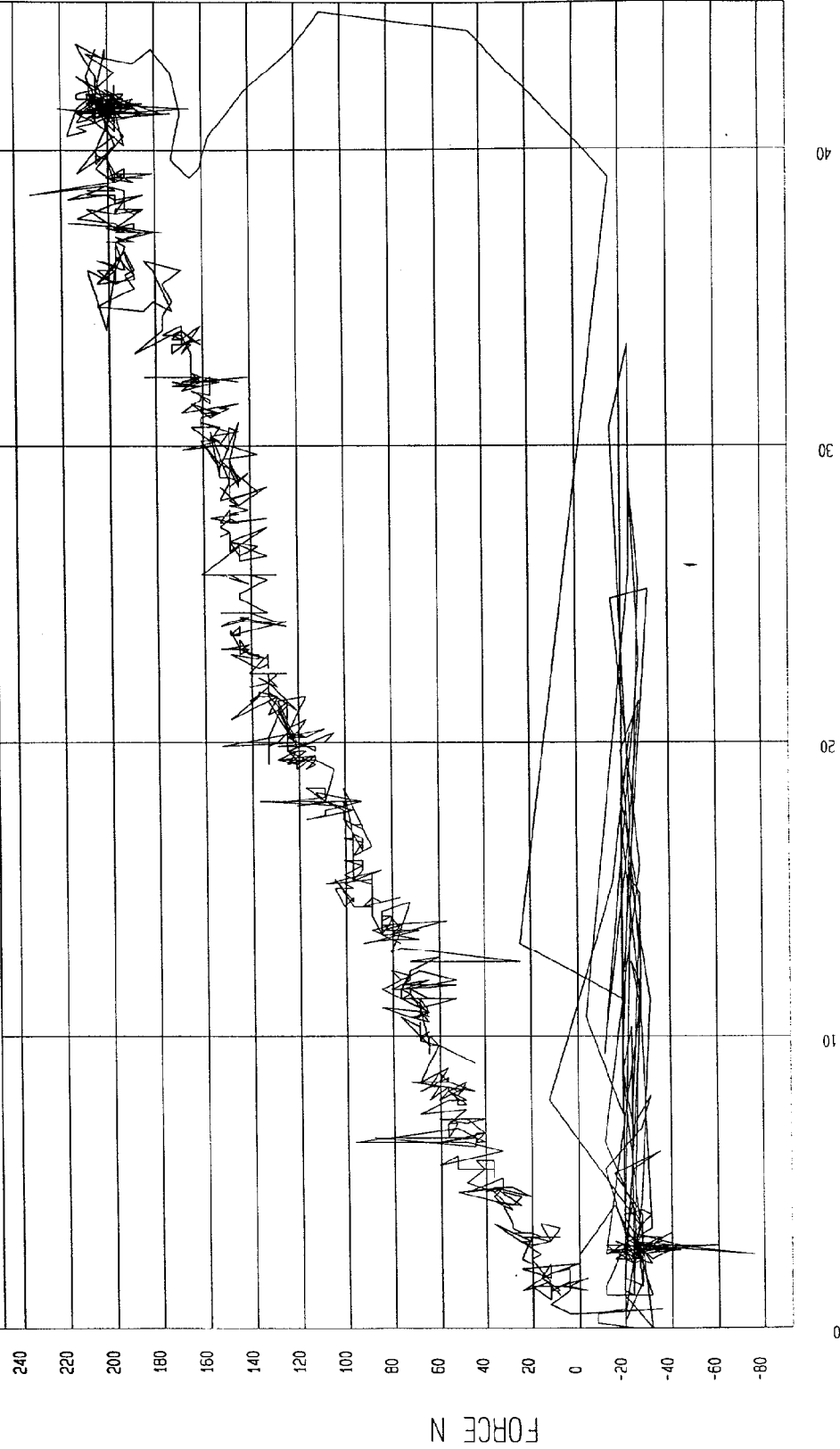
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-06-1999 - 12:15:03

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



WSA Research
01-06-1999 12:16

POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Passenger Dummy Serial Number: 272

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

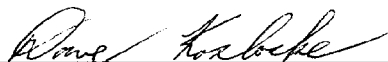
DUMMY SERIAL NUMBER: 272DATE OF VERIFICATION: January 7, 1999

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	892
RH - Rib Height (mm)	501 - 521	512
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	238
KV - Knee Pivot From Back Line (mm)	511 - 526	523
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	378

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99052

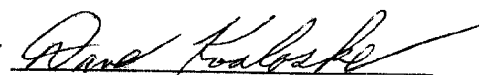
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46 g's	42
LOWER RIB (g's)	37 - 46 g's	39
LOWER SPINE (g's)	15 - 22 g's	15

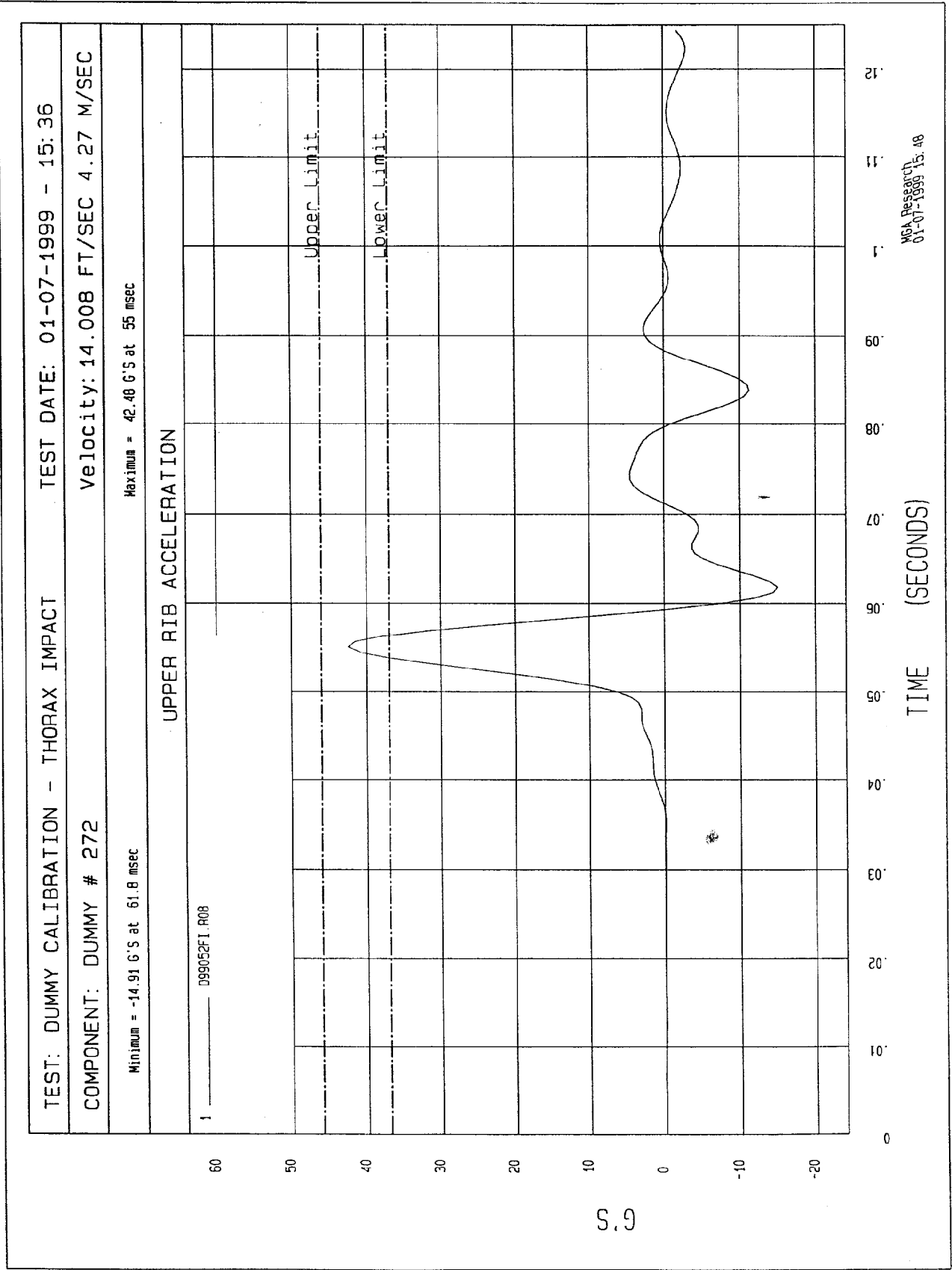
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





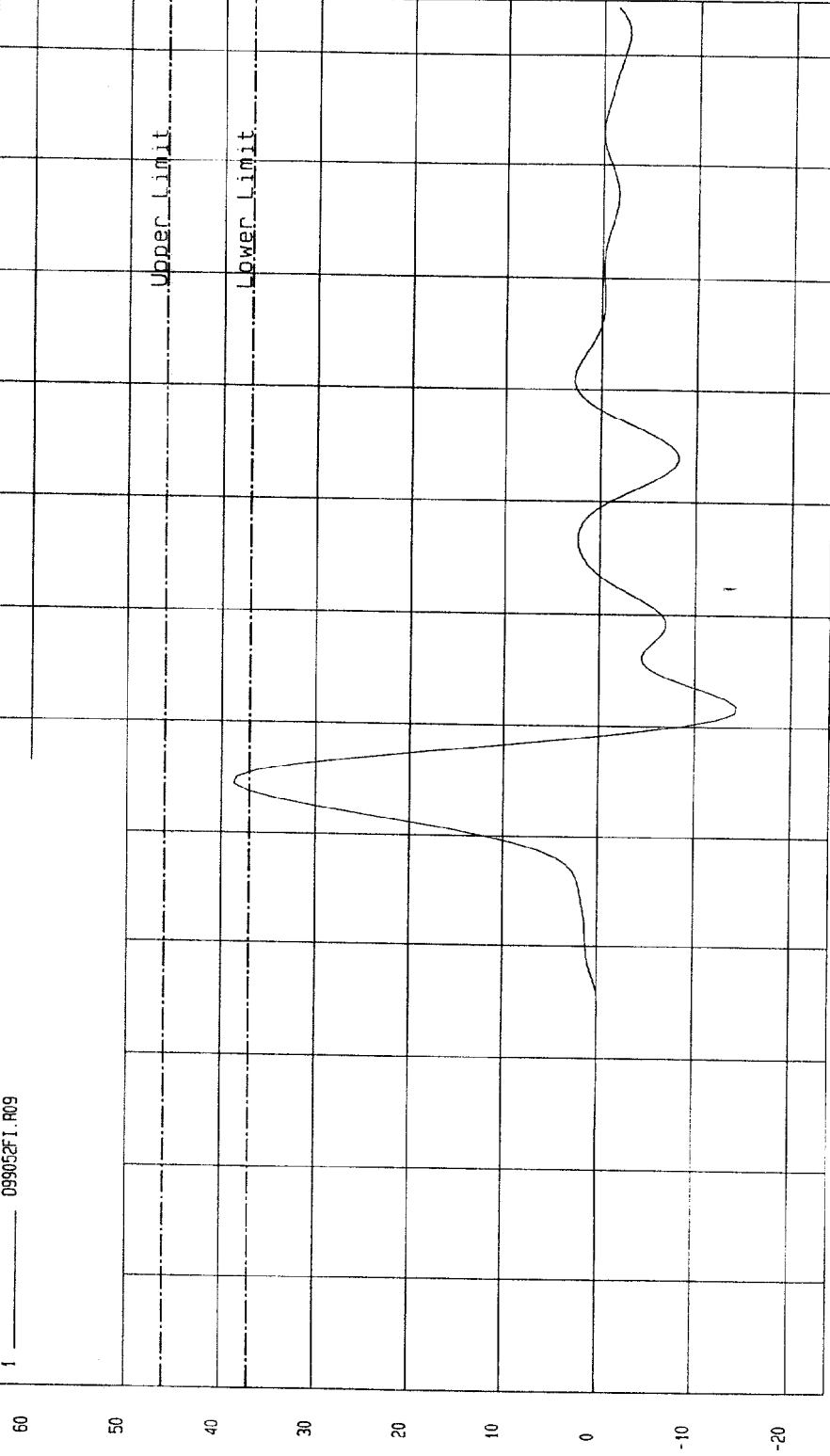
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 01-07-1999 - 15:36

COMPONENT: DUMMY # 272 Velocity: 14.008 FT/SEC 4.27 M/SEC

Minimum = -14.32 G'S at 61.8 msec Maximum = 38.71 G'S at 54.3 msec

LOWER RIB ACCELERATION

1 _____ 099052FT.R09



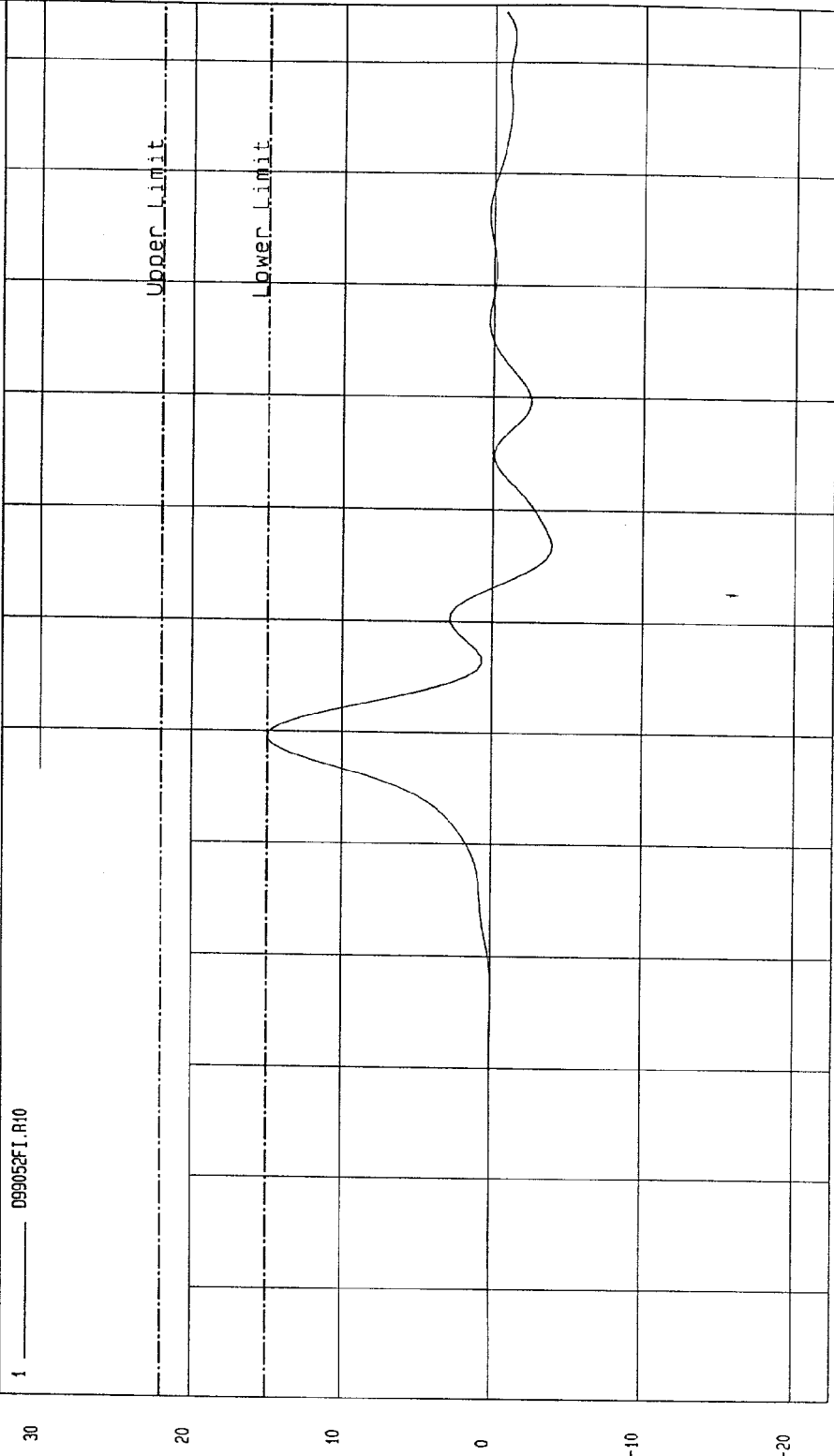
MCA Research
01-07-1999 15:19

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 01-07-1999 - 15:36

COMPONENT: DUMMY # 272 Velocity: 14.008 FT/SEC 4.27 M/SEC

Minimum = -3.98 G'S at 76.8 msec Maximum = 15.04 G'S at 59.3 msec

LOWER SPINE ACCELERATION



TIME (SECONDS)

MCA Research
01-07-1999 16:19

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

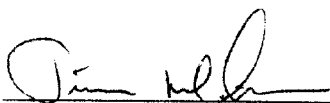
SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99053

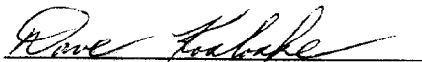
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.27
PELVIS ACCELERATION (g's)	40 - 60	60

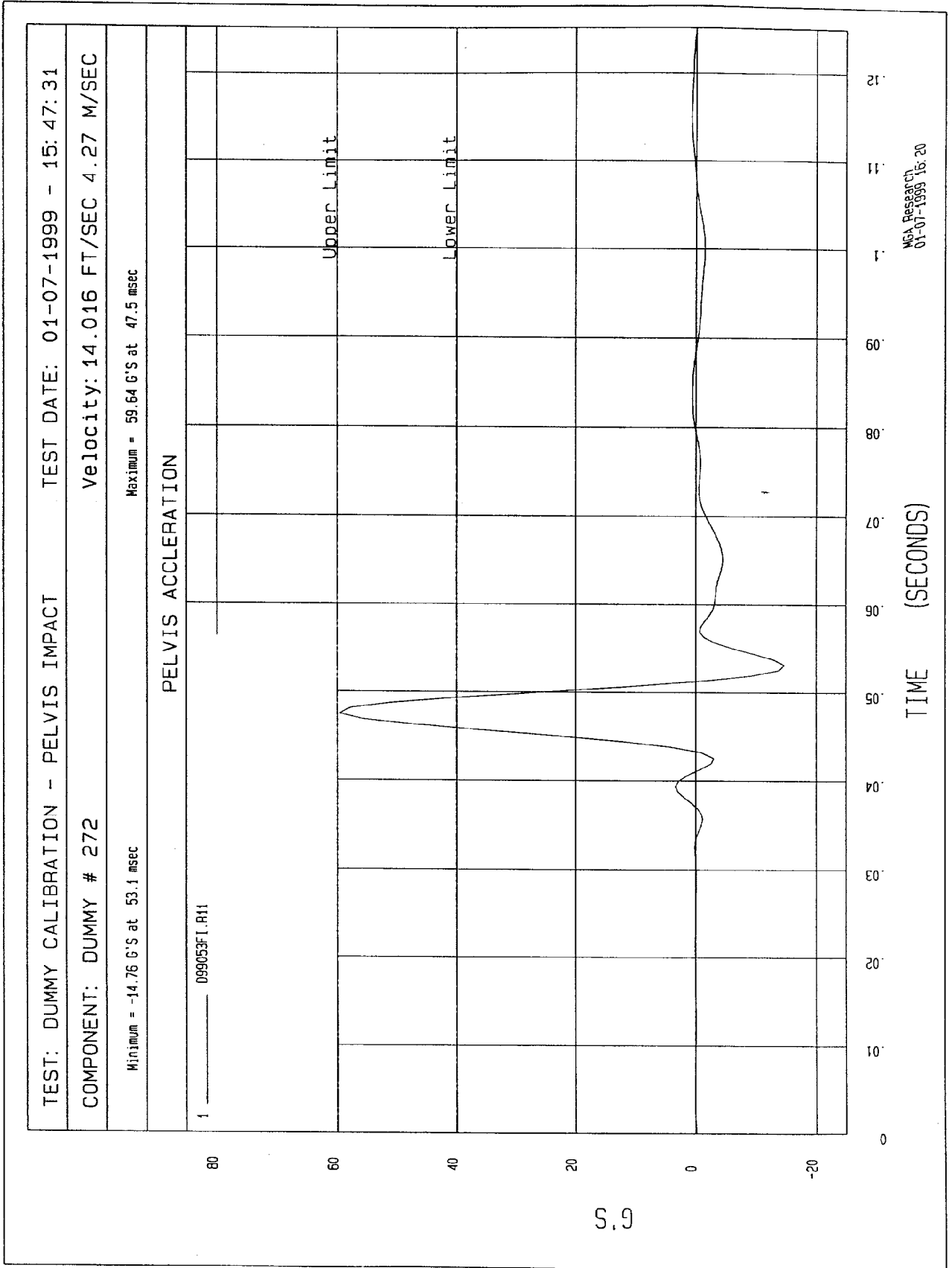
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST

(PRELOAD = 10 LBS)

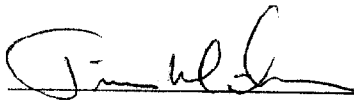
SIDE IMPACT DUMMY (SID)

DATE: January 7, 1999DUMMY SERIAL NUMBER: 272 TEST NUMBER: D99054

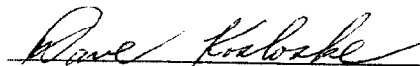
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
FORCE @ 12.7 mm	104 - 162	139
FORCE @ 19.0 mm	163 - 222	192
FORCE @ 25.4 mm	222 - 280	252
FORCE @ 33 mm	325 - 391	341

TEST MEETS SPECIFICATIONS

TECHNICIAN



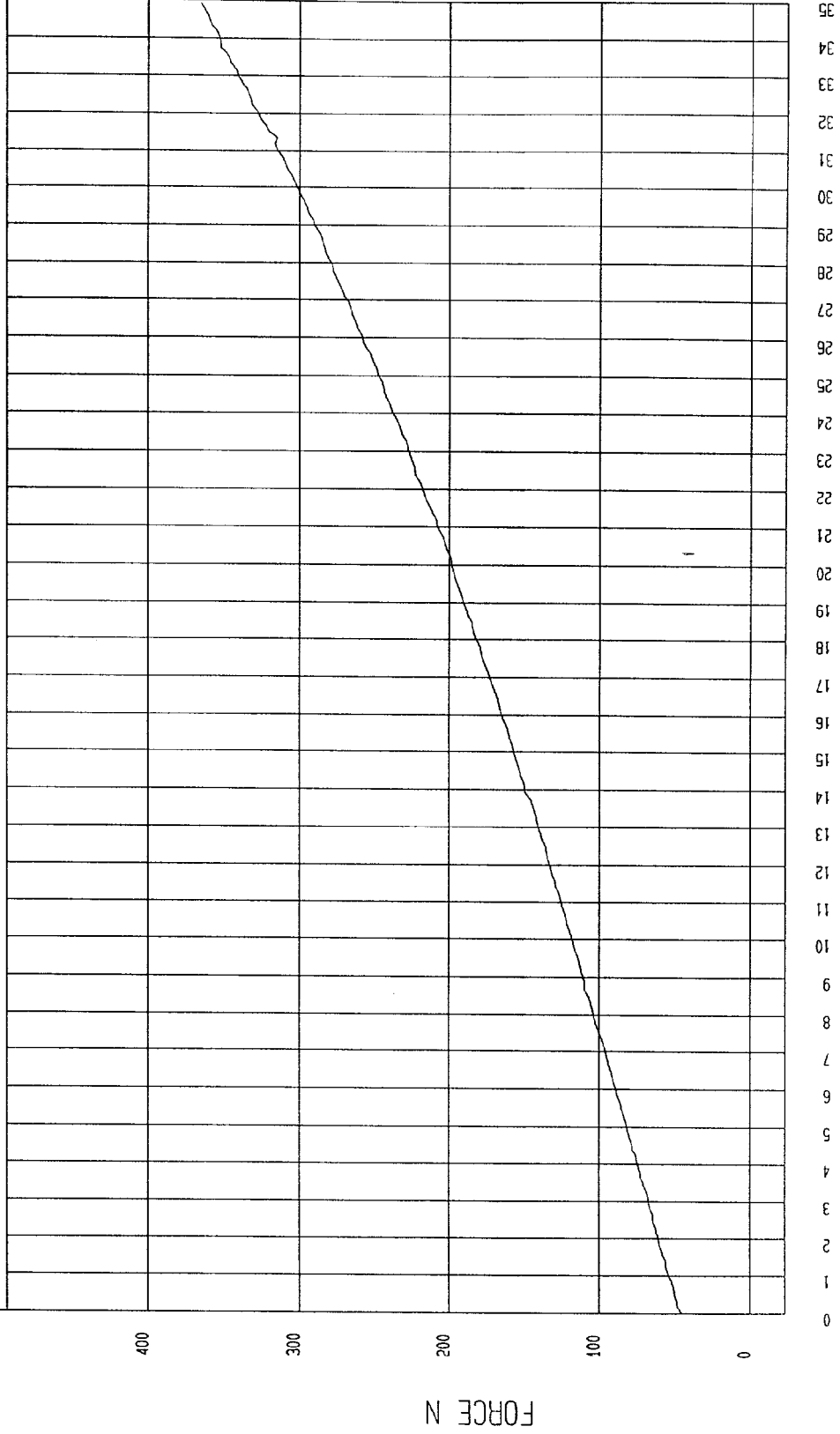
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-07-1999 - 11:45:57

COMPONENT: DUMMY # 272

FORCE as a function of DISPLACEMENT



MCA Research
01-12-1999 12:29

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

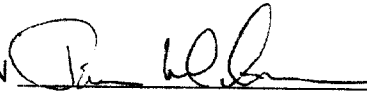
SIDE IMPACT DUMMY (SID)

DATE: January 6, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99055

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	20%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	105.8
FORCE @ 30°	151.2 - 204.6	166.1
FORCE @ 40°	204.6 - 258.0	214.2
RETURN ANGLE	12° maximum	3°

TEST MEETS SPECIFICATIONS

TECHNICIAN



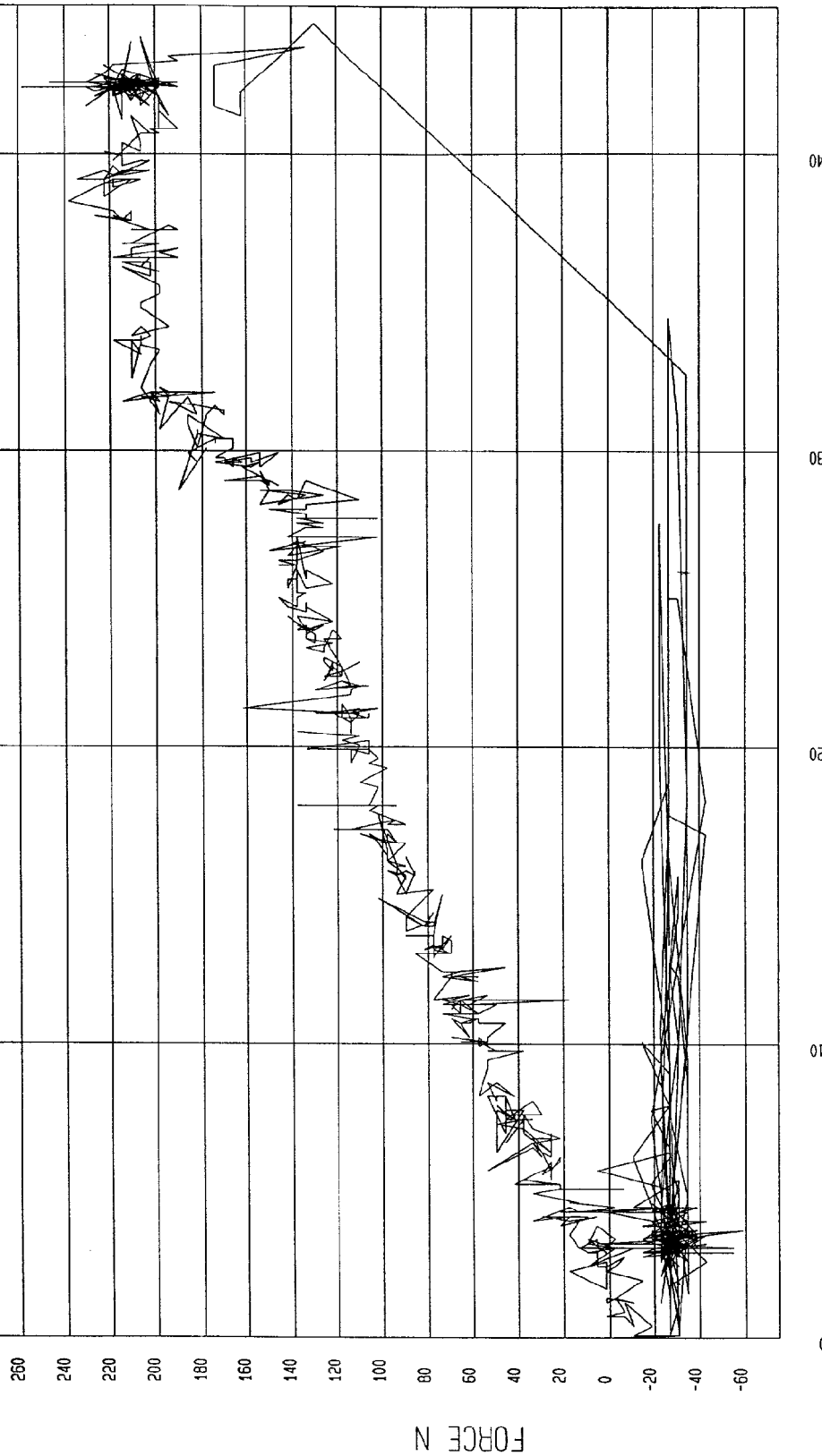
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-06-1999 - 10:23:00

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



MCA Research
01-06-1999 12:16

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 271

Inspected By: Tim Michnay

Date: January 7, 1999

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

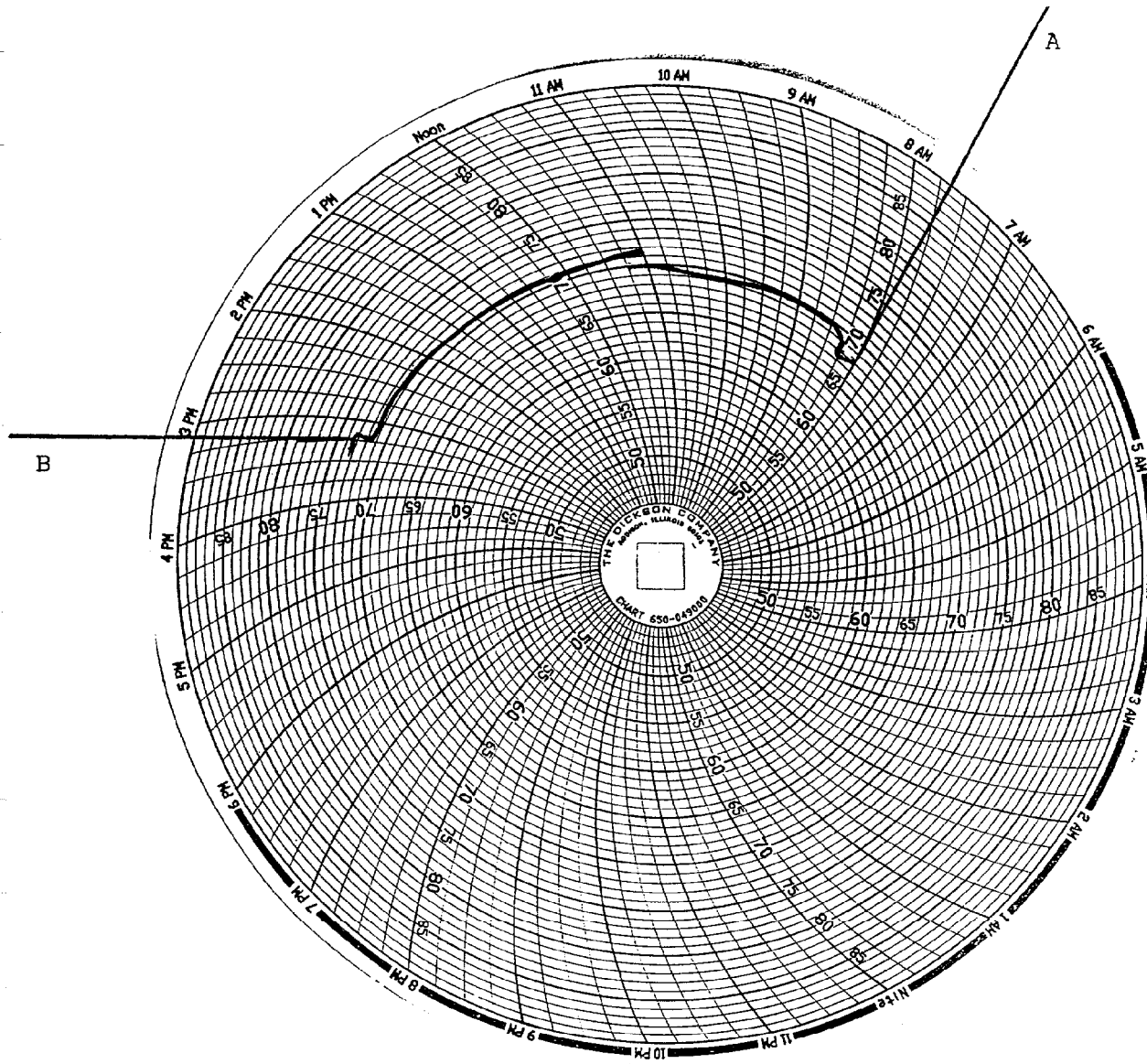
Serial Number: 272

Inspected By: Tim Michnay

Date: January 7, 1999

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

VEHICLE AND DUMMY TEMPERATURE

A = dummies installed in vehicle
B = test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR DRIVER DUMMY NO. 271

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AH0N9	Endevco	October 20, 1998
Lower Rib Y	AGP53	Endevco	October 20, 1998
Lower Spine Y	J12450	Endevco	October 20, 1998
Pelvis Y	AGP20	Endevco	October 20, 1998
Upper Rib Redundant Y	AHT20	Endevco	October 20, 1998
Lower Rib Redundant Y	AHTC3	Endevco	October 20, 1998
Lower Spine Redundant Y	J12461	Endevco	October 20, 1998
Pelvis Redundant Y	AGP20	Endevco	October 20, 1998
Head Center of Gravity X	J20392	Endevco	July 28, 1998
Head Center of Gravity Y	AGT18	Endevco	July 28, 1998
Head Center of Gravity Z	ALBA7	Endevco	July 28, 1998

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR PASSENGER DUMMY NO. 272

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AKAF3	Endevco	October 9, 1998
Lower Rib Y	ALEC1	Endevco	October 9, 1998
Lower Spine Y	J14120	Endevco	October 14, 1998
Pelvis Y	AKAH3	Endevco	October 14, 1998
Upper Rib Redundant Y	ALCN9	Endevco	October 9, 1998
Lower Rib Redundant Y	J10411	Endevco	October 9, 1998
Lower Spine Redundant Y	AP2F7	Endevco	October 14, 1998
Pelvis Redundant Y	AGM32	Endevco	October 14, 1998
Head Center of Gravity X	AJ9B0	Endevco	October 14, 1998
Head Center of Gravity Y	AHTR2	Endevco	October 14, 1998
Head Center of Gravity Z	AGTE9	Endevco	October 14, 1998

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	J06-D22	Entran	June 22, 1998
Moving Barrier CG Y	I18-E18	Entran	September 16, 1998
Moving Barrier CG Z	F12-G02	Entran	June 28, 1998
Moving Barrier Rear Axle X	H02-J02	Entran	December 15, 1998
Moving Barrier Rear Axle Y	J04-F16	Entran	December 15, 1998
Left Mid A-Post Y	F18-G08	Entran	September 16, 1998
Left Lower A-Post Y	F12-G06	Entran	June 18, 1998
Left Mid B-Post Y	J04-F12	Entran	December 16, 1998
Left Lower B-Post Y	J23-E06	Entran	December 15, 1998
Rear Floorpan Above Axle X	I26-D09	Entran	December 15, 1998
Rear Floorpan Above Axle Y	G01-J10	Entran	December 15, 1998
Rear Floorpan Above Axle Z	F12-G05	Entran	December 15, 1998
Driver Seat Track Y	B14-R16	Entran	September 16, 1998
Right Side Sill at Front Seat X	C25-A22	Entran	December 15, 1998
Right Side Sill at Front Seat Y	F11-G09	Entran	June 28, 1998
Right Side Sill at Front Seat Z	J10-E16	Entran	June 22, 1998
Right Side Sill at Rear Seat X	I25-J14	Entran	December 8, 1998
Right Side Sill at Rear Seat Y	J23-E10	Entran	December 8, 1998
Right Side Sill at Rear Seat Z	J23-E07	Entran	December 8, 1998

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO	MANUFACTURER	CALIBRATION DATE
Left Side Sill at Front Seat Y	I26-D02	Entran	December 15, 1998
Left Side Sill at Rear Seat Y	F20-G03	Entran	December 16, 1998
Right Rear Occupant Compartment Y	G13-B14	Entran	September 16, 1998
Vehicle CG X	K19-A11	Entran	August 27, 1998
Vehicle CG Y	K19-A15	Entran	August 27, 1998
Vehicle CG Z	K11-J17	Entran	August 28, 1998
Left Front Door on Centerline	F10-D02	Entran	December 16, 1998
Midrear of Left Front Door	I25-J13	Entran	December 16, 1998
Left Front Door Upper Centerline	A09-G06	Entran	December 16, 1998
Midrear of Left Rear Door	F11-G04	Entran	December 16, 1998
Left Rear Door Upper Centerline	J04-F10	Entran	December 16, 1998
Rear Seat Track	E13-D07	Entran	June 25, 1998

Note: All Endevco accelerometers are Model No. 7264-2000 All Entran accelerometers are Model No. EGE-72